AVIATION CONTRACT MAINTENANCE AND ITS EFFECTS ON AH64 UNIT READINESS

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE

by

SAMUEL S. EVANS, MAJ, USA
B.S., United States Military Academy, West Point, New York, 1985

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Name of Candidate: Major Samuel S. Evans

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Approved by:

_____, Thesis Committee Chairman
LTC Thomas J. Boyle, M.A.

_____, Member
MAJ Willis F. Jackson, Jr. M.P.A.

_____, Member, Consulting Faculty
COL Marshall J. Goby, Ph.D.

Accepted this 6th day of June 1997 by:

_____, Director, Graduate Degree Programs
Philip J. Brookes, Ph.D.

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

AVIATION CONTRACT MAINTENANCE AND ITS EFFECTS ON AH64 UNIT READINESS by MAJ Samuel S. Evans, USA, 88 pages.

This study investigates the use of contractors to perform aviation maintenance on U.S. Army helicopters. It traces the development of the concept of privatization and the evolution of this process to the point where, currently, many duties formerly performed by soldiers are now the responsibility of contractors. The study analyzes why privatization became necessary in aviation maintenance and analyzes the effects of privatizing the maintenance of AH64 helicopters using the criteria of training, cost, readiness and deployability.

The study concludes that the structure, training requirements and other nonproductive maintenance tasks required of today's soldiers forces commanders to hire contractors to maintain the readiness of the aviation fleet. The study also concludes that contractors are cost effective, when their cost and maintenance production is compared to soldiers. The readiness of aircraft is directly related to the number of maintenance man hours expended and it takes multiple soldiers to equal the production of one contractor. Based on the use of contractors to perform aviation maintenance in many of the most recent contingency deployments, the deployability of contract maintenance is not a problem. The study further concludes that the benefits of contract aviation maintenance can be enhanced if the Army formally recognizes the need for contracting and standardizes the program.

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LIST OF ABBREVIATIONS

AIT	Advanced Individual Training
ATCOM	Aviation and Troop Command
AVIM	Aviation Intermediate Maintenance
AWE	Army Warfighting Experiment
CFSR	Contract Field Service Representative
DEA	Drug Enforcement Agency
DOD	Department of Defense
EETF	Electronic Test Facility
FLIR	Forward Looking Infrared
FMC	Fully Mission Capable
GAO	General Accounting Office
I-MARC	Improved Manpower Allocation Resource Criteria
LAR	Logistics Assistance Representative
LOGCAP	Logistics Civil Augmentation Program
LRU	Line Replaceable Unit
MEO	More Efficient Organization
MOS	Military Occupational Specialty
MWO	Modification Work Order
NTC	National Training Center

OMB	Office of Management and Budget
PCS	Permanent Change of Station
PMC	Partially Mission Capable
PNVS	Primary Night Vision Sight
PWS	Performance Work Statement
QDR	Quadrennial Defense Review
SRA	Special Repair Activity
STIR	Special Technical Inspection and Repair
TADS	Target Acquisition and Detection System
USAREUR	United States Army Europe
VHA	Variable Housing Allowance

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CHAPTER 1

INTRODUCTION

Overview

> The American people have often complained of the intrusiveness of federal programs, of inadequate performance, and of excessive expenditures. In light of these public concerns, government should consider turning to the creative talents and ingenuity in the private sector to provide, wherever possible and appropriate, better answers to present and future challenges.[1]
>
> David F. Linowes, Report of the President's Commission on Privatization

As the downsizing of the United States military continues, invariably many new downsizing related phenomena occur, that require resolution, to ensure the continued readiness and stability of the United States Military Forces. One such phenomina that is prevalent and is gaining increasing momentum is the contracting out of tasks formerly completed by federal employees. Previously routine, daily tasks performed by federal employees (military or civilian) ranging from cleaning latrines to maintaining aircraft are now the work of civilian contract personnel. This circumstance is so widespread that new phrases, such as privatization and outsourcing are part of every senior military official's vocabulary. The privatization of formerly federal employee tasks will affect the overall performance of the military services in the completion of their required missions. Privatization may affect the military services performance either positively or negatively in many areas including budget, deployment capability, morale, retention, training, and the defense industrial base.

Background

With the end of the cold war, the United States government has the ability to reduce the size and focus of its military forces. Every president since the Reagan administration, which oversaw the beginning of the end of the Warsaw Pact, promised (and struggled) to reduce the size of government. Every administration promised a peace dividend to the American taxpayers. One might suspect that the phenomenon of privatization had its origins from recent administrations. However, privatization actually originated in the Eisenhower administration. In his January 21, 1954, budget address, President Eisenhower promised that, "This new budget marks the beginning of a movement to shift . . . to private enterprise federal activities which can be more appropriately and more efficiently carried on in that way."[2] In 1955, President Eisenhower continued to emphasize the shift to private enterprise when he said, "the Federal government will not start or carry on any commercial activity to provide a service or product for its own use if such product or service can be procured from private enterprise through ordinary business channels."[3] The intent of the policy was to reduce the competition of the government with the private sector and to increase the amount of government business the private sector received. Despite President Eisenhower's policy, the government was slow to act. In 1967, the Bureau of the Budget issued Circular A-76. This publication required federal agencies to review their commercial activities, to determine how much they cost the government, and to allow the private sector to compete with the government for those activities the private sector could perform at a lower cost.[4] Even with the more definitive guidance of Circular A-76, government agencies were still slow to initiate viable cost analysis programs because Circular A-76 did not provide definitive guidance on conducting the cost analysis. The Carter administration updated Circular A-76 in 1979.[5] The Reagan administration completed another update in 1983. The 1983 update provided an elaborate

methodology for comparing costs. It also required federal agencies to conduct efficiency studies as part of the cost comparison.[6]

Table 1. OMB Circular A-76 Categorization of Governmental Functions

Functions related to the act of governing	Functions related to monetary transactions and entitlements
Criminal investigations, prosecutions, and other judicial functions	Tax collection and revenue disbursements
Management and direction of the armed services	Control of the Treasury accounts and money supply
Activities performed exclusively by military personnel who are subject to deployment in a combat, combat support, or combat service support role	Administration of public trusts
Conduct of foreign relations	
Selection of program priorities	
Direction of federal employees	
Regulation of the use of space, oceans, navigable rivers, and other natural resources	
Direction of intelligence and counter intelligence operations	
Regulation of industry and commerce, including food and drugs	

The 1983 revision of the Office of Management and Budget (OMB) A-76 Circular laid out very specific procedures for conducting a cost analysis for contracting out.[7] The new procedures required each governmental agency to schedule government operations that could potentially be performed by a private contract for review. The A-76 Circular exempted certain activities from the program because they were "inherently governmental in nature." Table 1 shows the functions related to the act of governing which cannot be privatized.[8]

Again the OMB A-76 guidance was quite vague in its guidance and procedures. Although the table seems to provide some direction as to what types of governmental work are not authorized

to be contracted out, it left a lot of room for interpretation. It would seem that the restriction of "activities performed exclusively by military personnel who are subject to deployment in a combat, combat support, or combat service support role" would prohibit many of the military contracts in force today.

Other than the functions listed in the above table, all other government activities required review. To begin the A-76 process, a government activity first had to define what function it served. The Performance Work Statement (PWS) defined the activity's functions. Agencies used the PWS to define precisely the work requirement, the time necessary to produce it, and the quality of the finished product. The PWS became the requirements statement and specifications for contractors to bid against. The OMB intended that the revised A-76 Circular process would cause agencies to review the cost effectiveness of contracting out government work, while improving efficiency in the government agency. Agencies undergoing the A-76 study accomplished this by refining operating practices to develop its Most Efficient Organization (MEO). After development of the MEO, the agency determined the cost to operate the MEO. The cost to operate the MEO is the baseline that the OMB officials compare to contractor bids to determine whether the activity remains a government operation or becomes privatized. A contractor could win the contract if he could produce the same product to the same standard as the government employees and beat their MEO cost by 10 percent. Figure 1 depicts the normal flow of the A-76 review process.

In reviewing figure 1 it is interesting to note that the left side of the diagram is a continuous process, while if the work is contracted out the review process ends. This means that if a government workforce retains the work in-house, that activity is not exempt to future A-76 reviews.[9]

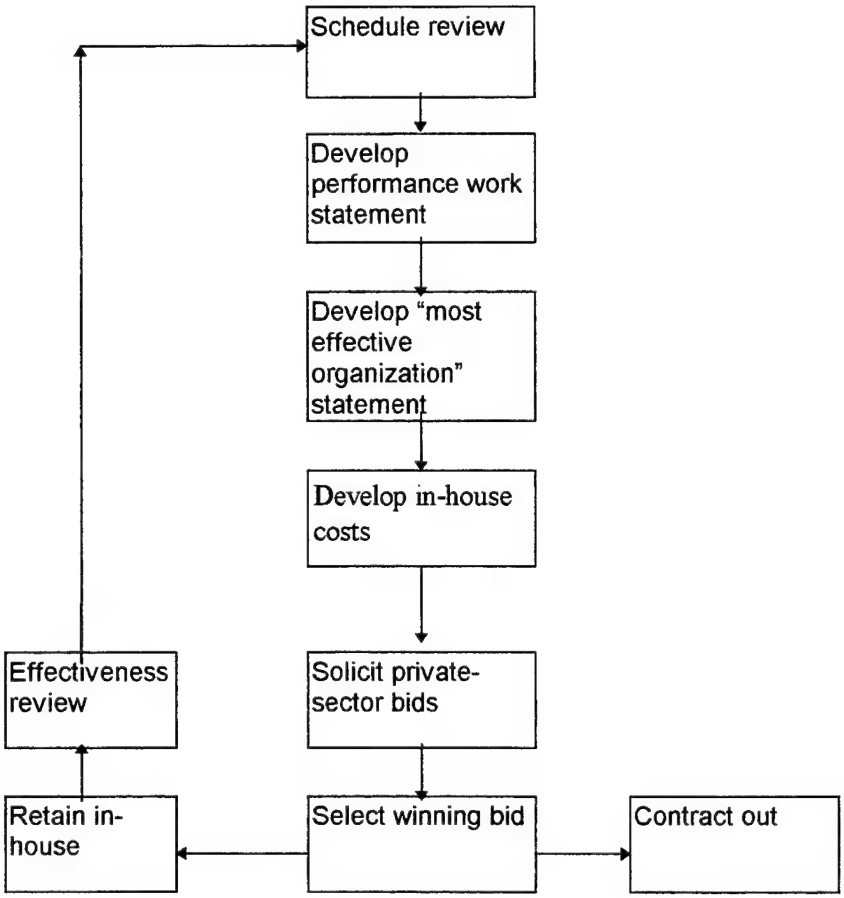

Figure 1. The A-76 cost study procedure. Source: General Accounting Office, Federal Productivity: DOD's Experience in Contracting Out Commercially Available Activities (Washington, D.C.: U.S. Government Printing office, 1988), 12.

By the end of 1980's the OMB A-76 Circular completed its metamorphosis from an Eisenhower idea to reduce competition between the public and private sectors to a bureaucratic albatross. The cost analysis procedure had potential to improve the efficiency of any agency under review. However, any government agency identified for review had to refocus its efforts from accomplishing its mission to reconfiguring, in order to survive. Much time was spent documenting the work they were supposed to accomplish rather than actually accomplishing the work. The

stress and uncertainty in an agency under review was often so great that many top employees fled to safer jobs. This left many agencies ill equipped to successfully compete with the contractors.

The Bush and Reagan administrations both proclaimed great success and cost savings as a result of the program. The OMB proclaimed total savings of nearly $696 million from fiscal 1981 to fiscal 1987, with the equivalent of 45,737 full-time positions freed to perform higher priority missions. The Department of Defense (DOD) saved $611,445 million and 37,064 positions during this period. The OMB also claimed that they saved an average of 30 percent from original costs (20 percent savings when government employees won and 35 percent savings when private contractors won). Private contractors beat the government employees in 55 percent of the competitions.[10] The government was still trumpeting the great savings in cost and personnel slots, when the cold war ended.

The entire OMB A-76 process was conceived, built, and refined during the cold war. It therefore had a cold war focus. Before the end of the cold war, the privatization focused mostly on installation level commercial activities, such as installation maintenance services, custodial services, refuse disposal services, and laundry and dry cleaning services. During the cold war, DOD adhered to the restriction of not privatizing activities performed exclusively by military personnel, as shown in table 1. The DOD actively restricted the amount of private sector maintenance performed. It also required public depot maintenance to maintain excess capability in peacetime to handle the surge in maintenance expected during a cold war conflict. The DOD expected that U.S. industry would mobilize fully for war production and would have little capacity to spare for repairs on military equipment.[11] The DOD recognized that overreliance on privatization, especially for such activities as military equipment maintenance, during the cold war was risky.

With the end of the cold war, the expectation of total U.S. industrial mobilization was diminished. Post-cold war military operations would be smaller regional conflicts. This mission change allowed privatization to take the next step to its present state. The DOD no longer considered maintenance of military equipment exempt from privatization. In fact, the downsizing of the U. S. Armed Forces, coupled with the increasingly technical equipment in the U.S. inventory made increased privatization necessary. By the early 1990s hiring a private contractor to perform critical maintenance on military equipment was commonplace. The Army did not have enough soldiers to perform all required tasks and properly maintain all its equipment. Since the main effort of the army leadership was to reduce total numbers of soldiers, it was much easier to justify a contractor than to keep a soldier.

This phenomena was especially true in army aviation maintenance units. The decade of the 1980s saw the completion of UH-60 (Blackhawk) fielding, the continuation of AH-64 (Apache) fielding and the beginning of OH-58D (Kiowa Warrior) and CH-47D (Chinook) fielding. These aircraft required increasingly technical maintenance personnel and more of them. The U.S. Army downsizing came at the exact time when Army Aviation Branch required more personnel. Increased reliance on contract personnel was the only possible solution.

Key Definitions

The definitions of the terms essential to understanding this study are:

Office of Management and Budget Circular A-76. The document, that originated in the Bureau of Budget before its name changed to Office of Management and Budget, which requires government agencies to perform analysis to determine if private government functions can be contracted to the public sector.

Contract Field Service Representative. A representative of a particular company, who is contracted by the Army to lend technical and logistical expertise for a particular system or component on a larger weapon system (i.e., McDonnell Douglas Target Acquisition and Detection System (TADS) on the Apache helicopter).

Commercial Activity. Any activity on an installation that receives payment for services performed for either organizations or individual service members (i.e., dry cleaning and laundry).

Contracting Out. The hiring of a private company to perform an entire public service originally intended for performance by a government employee.

Logistics Assistance Representative. A Department of the Army civilian employee assigned to lend technical and logistical expertise to Army units on specific pieces of tactical equipment.

Most Efficient Organization. The final, refined organization that a public agency undergoing an A-76 study develops to compete against the private companies attempting to win their work.

Out Sourcing. Contracting with a private company to provide goods or services formerly provided by government agencies.

Performance Work Statement. The specifications written by government for work performance. Included in this statement is the quantity, quality, and allotted time to perform this work. This statement is the description used to develop contract specifications when privatizing government work.

Privatization. Hiring a private company to perform tasks formerly completed by public employees.

Thesis

Does the ever-growing reliance of the United States Army Aviation Branch on contract performance of aircraft maintenance support improve AH-64 mission readiness?

Subordinate Questions

1. Will Army Aviation require contract personnel to maintain an effective fighting force in the next conflict?

2. Is it feasible for contract augmentation in an area of conflict?

3. At what level will the contract maintenance personnel be available in a conflict?

4. Is it cost effective to pay contractors to perform aviation maintenance instead of soldiers?

5. What effect does the reliance on contract personnel have on the training of soldiers?

Limitations

Much of the data required for a complete picture of Army Aviation contract maintenance is proprietary information, available only from the contractors. Where contract information was not available, best information was substituted.

Delimitations

Although the results of this study are probably relevant to all Army branches, and all Services, brevity required that it be limited to Army Aviation AH-64 maintenance privatization.

Significance of the Study

The increasing reliance on contract maintenance to adequately support Army Aviation is the result of government policies, old and new. If contract maintenance, versus soldier maintenance, is the best method for success on future battlefields, then the Army must develop

doctrine to support that method. If soldier maintenance is the best method to maintain Army aircraft, then the Army must change personnel policy to convert contract dollars into personnel billets. This study will attempt to determine the direction the U.S. Army should take on this issue.

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[1]President's Commission on Privatization, Report of the President's Commission on Privatization, David F. Linowes, Chairman (Chicago: University of Illinois Press, 1988), vii.

[2]John D. Hanrahan, Government by Contract (New York: W. W. Norton & Company, 1983), 84.

[3]Linowes, 1.

[4]Donald F. Kettl, Sharing Power, Public Governance and Private Markets (Washington D.C.: The Brookings Institute, 1993), 42.

[5]Ibid., 42.

[6]Ibid., 43.

[7]Ibid., 44.

[8]General Accounting Office, Government Contractors: Are Service Contractors Performing Inherently Governmental Functions? (Washington, D.C.: U.S. Government Printing office, 1991), 20.

[9]Kettl, 45.

[10]Kettl, 46.

[11]Congressional Budget Office, Public and Private Roles in Maintaining Military Equipment at the Depot Level (Washington, D.C.: U.S. Government Printing office, 1995), 1.

CHAPTER 2

LITERATURE REVIEW

The quality and availability of literature on privatization and related issues covers a wide spectrum. Most of the literature comes from a relatively narrow expanse of time. All sources referenced are from 1983 to present. Within such a short period, many researchers have looked at various aspects of privatization of the government. The literature runs the gamut from pro privatization to anti privatization. The prevailing opinion seems to originate with the opinion of the Executive Branch of the U.S. Government. In fact, the author of one study noted a distinct shift between the pro market Reagan years and follow-on administrations. He shares this excerpt, "The idea behind A-76 . . . as outlined in a 1983 OMB memorandum, was that 'in the process of governing, *the Government should not compete with its citizens*. . . . In commercial sources to supply the products and services the Government needs.'" (italics mine). He contrasts that with an opening line from a 1993 Center for Naval Analysis study that said, "Government policy – outlined in Office of Management and Budget (OMB) Circular A-76 – *is to allow private sector companies to compete with government organizations*. . . . The goal is to use competition to encourage efficiency – whether the function is contracted out or not" (italics mine).[1] All recent administrations have stressed the importance of decreasing the size of government. Some administrations placed more emphasis on privatizing than others.

The first block of research available on the subject of privatization comes from the early 1980s. This was immediately following the last major revision of the OMB A-76 Circular.[2] These

works start at the earliest source, John D. Hanrahan's book Government by Contract, which was published in 1983. This book is an insightful piece that discusses the spreading influence of contractors hired by the Government and their influence on Government. The intent of the Reagan administration is provided in Privatization Toward More Effective Government. This book, published in 1988, is the results of the President's Commission on Privatization. This special commission was convened by an executive order to study privatizing as many aspects of government as possible. The only other privatization works in the 1980s are all military research papers on the effects of OMB A-76 or the difficulty in applying the guidance of OMB A-76.

The popularity of privatization evident in most of the early works gives way to numerous studies and reports in the early 1990s that are rather negative towards the issue of privatization. It almost seems that the critics waited for President Reagan to leave office before voicing their opinions. This negativism is published in General Accounting Office reports and other government studies.

The proponents of privatization come back to life in studies published in 1992 to present. Most of the works during this period are military-related studies. With the effects of the military downsizing just taking hold at that time, it is no wonder that many military researchers investigated the possibilities of supplementing their structure with contractors.

Looking more specifically at AH-64 (Apache) helicopter privatization literature, there is little. Most of the information regarding the Apache helicopter is specific to the helicopter. Other than a few references to the AH-64 being heavily reliant on contract maintenance, few authors have drawn any link between the Apache and privatization. The AH-64 literature used for this study included numerous General Accounting Office reports and papers from the nation's advanced military studies institutions.

Although there is a limited amount of research, from a limited time period, available on privatization, all the works had some value. No work rises above the others as the authority on privatization. It is necessary to digest all the works in the context of the time period that their authors wrote them to obtain the true visualization of privatization, as it exists today. Past studies looked at privatization in the military from the perspective of the serving U.S. president. Other studies looked at privatization in the military while under the stress of the reduced force structure of the U.S. military. This study intends to take an objective look at the utility or danger of privatization within U.S. Army Aviation maintenance, without regard to those pressures. Hopefully, privatization as it relates to U.S. Army Aviation maintenance represents a microcosm that can determine privatization's effect on the rest of the military.

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[1]Richard M. Bejtlich and Geoffry P. Hickman, Military Privatization: A Framework for the 1990s and Beyond (Cambridge, MA: John F. Kennedy School of Government, April 1996), 15.

[2]Donald F. Kettl, Sharing Power, Public Governance and Private Markets (Washington, D.C.: The Brookings Institute, 1993), 43.

CHAPTER 3

RESEARCH DESIGN

Methodology

As previously discussed, the purpose of this paper is to utilize Army Aviation maintenance on AH-64 aircraft to study the benefits and problems associated with privatization throughout the Army. In order to explore the broad effects of privatization on AH-64 aircraft maintenance, I will examine four key criteria to analyze privatization as it affects AH-64 maintenance. These key criteria include training, cost, readiness, and deployability. These criteria will be utilized to identify the effects that privatization has within each area. Privatization may be effective in some areas and ineffective in others. It is the purpose of this study to identify the positive and negative effects of privatization to determine how the Army may benefit from increased privatization and also identify the areas that require further review due to the negative effects of privatization.

Within active units, soldiers usually provide all routine aircraft maintenance. The requirements for contract maintenance within the Active Army units has recently, dramatically increased due to the effects of downsizing and the increased operations tempo within Army Aviation. The soldiers in active units find themselves with less and less time to perform aircraft maintenance, while the number of flying hours per aircraft increases. The soldiers also find themselves victims to an Army training system that is intensively managed and extremely time intensive. This Army training system reduces maintenance time available even further. To close

this gap, commanders have hired contractors to increase the amount of maintenance performed on aircraft. This study will evaluate aviation maintenance contracts within active Army units to determine its effect on the performance of the Army.

The first area of AH-64 contract maintenance that I will analyze is training. I will analyze training from various aspects. First I will discuss the training that all soldiers are expected to accomplish to be soldiers. Although important for all soldiers, this training is a large distracter from the mission of performing aircraft maintenance. This required training keeps aviation maintenance soldiers from devoting all their time to aircraft maintenance. Contract maintenance fills this gap. Next I will compare the experience level and training of contract maintenance personnel and soldiers performing AH-64 maintenance. I will then analyze the amount of aviation maintenance training lost to the soldier due to contract performance of maintenance. Numerous proposed soldier and contractor maintenance concepts will be developed. The advantages and disadvantages of each system will be analyzed. An optimum mix of soldier and contract maintenance will be recommended to meet Army readiness requirements.

The Army spends millions of dollars on AH-64 maintenance contracts. This study will compare the cost of the use of contract maintenance with the cost of using soldiers for Apache maintenance. Although contracts seem rather expensive, when compared to the hidden costs of soldier maintenance, contracts may seem more reasonable. This study will examine the costs of contract maintenance personnel and compare those costs to soldier maintenance personnel.

Readiness is always an important issue for the Army. This study will evaluate the readiness of AH-64 aircraft as a result of contract maintenance. The AH-64 is an extremely complex aircraft that may be beyond the means of purely soldier maintenance. This study will evaluate the level of reliance that the AH-64 aircraft has on contract maintenance and whether reliance on contract maintenance affects the Army positively or negatively.

Finally, this study will evaluate the deployability of the AH-64 maintenance support structure. Soldiers are trained and prepared to deploy anywhere on short notice to support the mission of their unit. Contractors are not usually as prepared to do the same thing. This paper will evaluate the considerations in deploying contractors to perform contract maintenance in support of Army missions.

Although this analysis only looks at how privatization affects Army AH-64 maintenance, decision makers can draw parallels to any Army weapon system. Using this study as an outline to evaluate their particular system maintenance plan, future decision makers will be better able to make an informed decision. Instead of blindly assuming that privatization is the panacea for all ills, this study hopes to identify the best uses of privatization. With this model, the entire Army can benefit from the proper distribution of privatization.

CHAPTER 4

ANALYSIS

Background

In order to understand how privatization became such a large piece of the Army aviation maintenance environment, it is necessary to examine each of the key areas of training, cost, readiness, and deployability. Within each of these areas, there are reasons for and against privatization of Army aviation maintenance. This study will examine each of these areas to answer several key questions:

1. What advantage does privatization lend?
2. What disadvantages are associated with privatization?
3. What are the alternatives to privatization?
4. Is privatization the best alternative to solve Army maintenance shortcomings within this area?

Answering these questions for each of the key areas of training, cost, readiness, and deployability will determine whether privatization is the best solution, the only solution, or a bad solution for the Army.

Training

On the first page of FM 22-100 former Chief of Staff of the Army General Carl E. Vuono

is quoted as saying, "Training is the cornerstone of readiness—it is the top priority for the Total Army."[1]

Training is, and always will be, a high priority for the Army. If one were to take General Vuono's quote figuratively, it would mean that it is impossible to sustain readiness without proper training. That is definitely true within Army Aviation maintenance and even more true as applied to highly technical aircraft, such as the AH-64 Apache. The training required to properly troubleshoot and maintain such a complex weapon system as the Apache helicopter takes months of formal training and years of experience.

Unfortunately for the soldiers tasked to maintain the Apache, General Vuono was not referring to training to maintain an aircraft. He was referring to the more traditional training conducted by combat soldiers. In truth, to Army maintainers, if training is the cornerstone to readiness, it can, at times, also be the wrecking ball.

The training to which General Vuono refers is other Army training. The Army requires all soldiers, including those trained with such technical Military Occupational Specialties (MOSs) as Apache mechanics, to complete certain tasks at certain intervals for the Army to consider them a trained soldier. Some of these training events include: physical training, Sergeant's Time, noncommissioned officer professional development, weapons firing ranges, Nuclear, Biological and Chemical (NBC) ranges, and Common Task Testing. Numerous commanders have identified the difficulty of meeting all required training requirements, while maintaining aircraft. Leaders at all levels, from the Chief of Staff of the Army down to aviation unit maintenance commanders, have completed studies to determine exactly how much time soldiers have to perform actual maintenance tasks. Below is an example of one of these studies. An aviation battalion in the 9th Infantry Division at Fort Lewis performed this particular study in 1988.[2] Although some of the training requirements are the result of local policy, they are representative of similar requirements at other

installations. Figure 2 shows the typical total time available in a training week for soldiers to perform all their mandatory training requirements and required aircraft maintenance. Figure 3 shows the hourly schedule by day for a typical divisional aviation unit. This analysis shows that during a normal (Monday through Friday) 49.5-hour training week, only 29.5 hours (or 59.6 percent of the training week) are available to perform training and maintenance on aircraft. This number of hours is available only during the best week. Any week that leaders schedule training beyond the routine schedule, the leaders further reduce the available maintenance time. Also note that the schedule does not reflect the weekly routine meetings that cause key maintenance personnel to be unavailable for various periods of time. According to FM 25-101, "Training meetings are non negotiable at battalion and company level."[3] This requirement causes most key staff members at the company and battalion level to spend at least five hours per week preparing for and attending training meetings to coordinate weekly soldier training.

Monday	5.50	
Tuesday	7.25	
Wednesday	5.50	
Thursday	5.75	
Friday	5.50	
Total	29.50	hours per soldier per week, or 5.9 hours per soldier per day available for training or aircraft maintenance

Figure 2. Total Weekly Training Time Per Soldier

Monday, Wednesday, and Friday
0630-1700 = 10.5 Total hours available per day
0630-0900 - 2.5 Physical training/Personal hygiene
1200-1300 - 1.0 Lunch hour
0900-0915
1300-1315 - .5 Formations at 0900 and 1300 (15 minutes each)
1030-1045
1500-1515 - .5 AM and PM breaks (15 minutes each)
1630-1700 - .5 Clean-up/preparation for next day
5.5 hours per day available for training or aircraft maintenance

Tuesday
0715-1700 = 9.75 Total hours available per day
0715-0730
1200-1300 - 1.00 Lunch hour
1300-1315 - .50 Formations at 0715 and 1300 (15 minutes each)
1030-1045
1500-1530 - .50 AM & PM breaks (15 minutes each)
1630-1700 - .50 Clean-up/preparation for next day
7.25 hours per day available for training or aircraft maintenance

Thursday
0715-1530 = 8.25 Total hours available per day
0715-0730
1300-1315 - .50 Formations at 0900 and 1300 (15 minutes each)
1200-1300 - 1.00 Lunch hour
1030-1045
1400-1415 - .50 AM & PM Breaks (15 minutes each)
1500-1530 - .50 Clean-up/next day preparation
5.75 Hours per day available for training or aircraft maintenance

Figure 3. Typical Training Week

Figure 4 shows the training days available in a year. The training day analysis shows that only 162 days are available each year to train and perform maintenance after removing all other training requirements. This number of available training days would be even worse if the unit did

not take advantage of the extended duty hours available when the unit is deployed to the field. The Fort Lewis study added twenty-nine days to the available training days because of field training.

365	Days per year
-104	Weekend days (52 Weekends X 2 Days)
- 30	Days leave and passes
- 28	Staff duty (average of 14 days duty plus next day off = 28 days)
- 5	Post guard duty (15 total days of post guard plus 9 days train-up for 75 soldiers)
- 10	Changes of command (Corps = 2 days, DIV = 2 days, CBAA = 1.5 days, DISCOM = 1.5 days, BN = 1.5 days, CO = 1 day)
- 10	Federal holidays (New Years, Martin Luther King Day, Presidents Day, Memorial Day, Fourth of July, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day, Christmas
- 6	Pay day activities (12 days X .5 = 6 days)
- 4	Christmas reduced manning days (8 days X .5 = 4 days)
- 3	Sick call days (average # days on quarters per soldier per year)
- 2	Company training holidays
- 1	BN training holidays
- 2	Retirement ceremonies
- 2	Division run days
- 2	FTX compensation time
- 2	Inventories (set, kits, outfits required 30 & 90 days, change of command)
- 14	Taskings (ROTC, fall clean-up, annual training, Team Spirit, NTC, other)
- 1	Organization days (BN = .5, company = .5)
+ 29	Days gained during training time available in exercises
162	Days for training

Figure 4: Training Days Per Year

Figure 5 shows the mandatory training requirements, the regulation that mandates the training, and the time required for the training. The required training analysis shows that regulations prescribe 570 hours of mandatory training. A unit only has 162 days of training available. If each of these days is a ten-hour day, then there are 1,620 hours of training time available. If the 570 hours of prescribed training is subtracted from the available 1,620 hours, the unit has only 1,050 hours available to maintain aircraft. This analysis demonstrates the frustration

Subject	Requirement	Reference Regulation	Annual Required Hours
PMCS	Week	AR 750-1	156
CTT Training	Week	STP 21-1	52
IND Weapon Qualification	Annual	AR 350-4	8
Alcohol/Drug Program	Semi-annual	AR 600-85	4
EO/Sex Harassment	Quarter	AR 600-21	4
ELSEC	Annual	AR 350-3	1
Property Accountability	Annual	DA PAM 710-2-1	1
Military Justice	Annual	AR 350-212	1
Injury Prevention	Annual	AR 40-5	1
Hearing Test	Annual	AR 40-5	1
OPSEC	Annual	AR 530-1	1
Command Information Brief	Annual	AR 360-81	24
SAEDA	Annual	AR 381-12	1
First Aid	Annual	AR 40-3	1
Water Safety	Annual	FL REG 350-15	8
Crime Prevention	Quarter	FL REG 190-31	4
SQT Test	Annual	FL REG 300-37	4
Low Density MOS TNG	Week	9ID REG 350-2	208
OPD/NCOPD	Quarter	9ID REG 350-1	24
EDRE	Annual	9ID REG 350-1	16
4 Mile Run	Month	9ID POL 350-11	12
12 Mile Road March	Semi-annual	9ID POL 350-11	8
NBC MOPP 4	Annual	9ID REG 350-1	6
CTT Test	Annual	9ID REG 350-1	5
Fit to Fight	Semi-annual	9ID REG 350-1	4
LAW Qualification	Annual	9ID REG 350-1	4
Hand Grenade Range	Annual	9ID REG 350-1	3
Claymore Demonstration	Annual	9ID REG 350-1	2
Individual Weapon PMI	Annual	9ID REG 350-1	2
NBC CS Chamber	Annual	9ID REG 350-1	2
Hand Grenade Instruction	Semi-annual	9ID REG 350-1	2
TOTAL			570 HOURS

Figure 5: Mandatory Training Requirements

that all the other required training can create for aviation maintenance soldiers, who have aircraft maintenance to perform. Rather than having the time to practice the trade they joined the Army to learn, they must perform other tasks. Then they must allow contract workers to do the work that they do not have time to perform.

While the training listed in figure 5 is all very valuable to the Army, this extensive list of required training reduces the amount of time available for soldiers to work on aircraft. Leaders owe their soldiers the training necessary to survive on the battlefield during war. However, the preponderance of soldiers performing aircraft maintenance will perform the majority of their service in rear areas, less susceptible to direct enemy contact. Yet, the aviation maintenance soldiers perform basically the same individual weapons and NBC training as an infantry or armor soldier. The Army could conserve the valuable resources of time and money by developing a training requirement more in line with the soldier's wartime mission. The current requirement only reduces the available maintenance opportunities for soldiers who will perform aircraft maintenance in lower risk areas during war. The reduced time for aircraft maintenance, in turn, results in reduced aircraft readiness rates. In contravention to General Vuono's quotation, within aviation units, training does not improve readiness it actually reduces it.

Although one might think that a similar analysis of a contractor's actual work production would show inefficiencies not unlike the Army work schedule, the Army has overcome these potential shortcomings through contracting for hours of maintenance production rather than contracting for a specific number of employees. Observations of the contractor's administration of employee work output at Fort Campbell revealed a tightly controlled work schedule. The contract employees normal duty day is prescribed by the contract as 7:00 a.m. to 3:30 p.m., Monday through Friday.[4] This schedule provides for a eight-hour work day and a half-hour lunch break. The supervisors allow the employees 15 minutes for set-up at the beginning of the day and 15

minutes for cleanup at the end of the day. The remaining 7.5 hours is actual maintenance production time.

Training personnel to maintain complex equipment can be a challenge for any business. The Army performs this training as well as (and possibly better than) any other employer in the world. There is a saying, commonly heard within Army maintenance circles, that describes the challenges that faces Army maintenance trainers. The saying claims that the Army is the only organization to take a person directly from high school, who previous to joining the Army could not change the oil in a car, and train him to fix helicopters in eight weeks. Although this quip is a slight exaggeration, it is basically true. Attack helicopter units routinely receive soldiers directly from their basic training and advanced individual training. The Army takes eight weeks to turn a civilian into a soldier (basic training) and then another eight weeks to train that soldier in the intricacies of helicopter repair (advanced individual training). The soldier arrives at the unit familiar with aircraft systems, his tools, and basic repair techniques. It is up to the unit to provide the soldier with the necessary experience and additional training to form the soldier into a fully capable maintenance team member. Unfortunately, the other Army training requirements take priority.

Sergeant's Time is an example of how Army soldier training conflicts with Army maintenance training. Sergeant's Time is a top driven, weekly, mandatory training event that occurs in every Army unit. It is a weekly "five hours of uninterrupted training" that noncommissioned officers can use to improve the skills of their soldiers. Army leaders designed Sergeant's Time to be an opportunity for noncommissioned officers to train their particular sub unit in critical tasks. Although a well-conceived idea, within most units, commanders, at some level, have removed most of the flexibility in training opportunities. As with any Army program, leaders, at all levels, adjusted the program to meet the needs of their particular unit, in the name of

standardization. Division level commanders usually dictate the time for training and the type of training conducted in order to limit soldiers wasting this training opportunity by conducting business as usual. Leaders usually restrict Sergeant's Time to general Army type training, such as Common Task Training, NBC, marksmanship, and land navigation. Division or higher level commanders usually set the day and time for Sergeant's Time. This allows entire installations to shut down all administrative services for that time. In theory, this gives administrative soldiers the opportunity to conduct Sergeant's Time and allows the civilians in those offices to catch up on paperwork, while all their customers are training. Because this program effectively uses up a tenth of the entire training schedule each week, it does not always translate well to units with critical support missions. The same division level commanders that mandate that all soldiers attend Sergeant's Time training will often schedule an aircraft to visit training units, or to enhance other unit's training. Helicopters are such a highly valued asset, that they are always in demand. In order to support all required missions, soldiers must use every available moment to maintain them. For aviation units, Sergeant's Time does not allow them to conduct necessary training in their MOS and uses up a large portion of their maintenance time. If leaders allowed NCOs the flexibility to use Sergeant's Time to conduct training in MOS skills on aircraft, it would enhance the soldiers training and enhance the readiness of the fleet.

Training is not the only activity that reduces the number of soldiers available to perform aircraft maintenance. There are also the seemingly innumerable tasks that go hand in hand with being a part of a military organization. Units must give up numerous soldiers to support installation level activities. Due to the shortage of funds to pay civilian workers, many installations are not able to staff such important installation activities such as gyms and pools with civilian workers. These resources contribute to the overall readiness of the installation by increasing the fitness of soldiers. Therefore, rather than close the gyms or reduce the operating hours, many

installations have substituted soldiers to staff these activities. The Army refers to these jobs as special duty (SD) assignments. The installation commander requires each unit on the installation to provide soldiers, for up to six months at a time, to staff special duty assignments. It is quite common to have up to five soldiers per battalion performing such duties. For example, at the 101st Airborne Division, the installation has divided its special duty assignments among the units within the division. Although the 101st Aviation Brigade is responsible for manning eighteen special duty assignments under the latest tasking list, it is actually providing twenty-two soldiers for such duty.[5] It is quite conceivable that a soldier trained to maintain Apache helicopters spends every day for six months handing out basketballs at the installation gym.

Motor pool maintenance is another area that contributes to nonproductive aircraft maintenance time. Maintenance on ground vehicles is just as essential to military readiness as maintenance on aircraft. Often other units accuse aviation units of neglecting their ground vehicles. Aviation units usually do their best with the available assets. The problem is that aviation units have fewer personnel to maintain more equipment than most other units in the Army. The current Army Aviation authorization documents do not accurately reflect actual personnel requirements. The Army personnel system utilized an interim manpower allocation and resource criteria (I-MARC) model, that is now believed inaccurate, to develop these authorizations. The result is that aviation units have fewer maintenance personnel for more equipment than armor and mechanized infantry units have per tank or fighting vehicle.[6] A figure used to graphically depict the difference in available maintenance personnel and maintenance requirements between an aviation unit and an armor unit is shown in appendix A. To make the situation worse, a helicopter is an extremely maintenance intensive piece of equipment. It has numerous critical moving parts that require inspection and servicing after every flight. Due to the possible catastrophic outcome of any flight operation, the maintenance standards for aircraft are much more stringent. A tracked or

wheeled vehicle just stops on the road and calls for assistance when its engine quits running. A helicopter does not have that option. Therefore an aviation mechanic will concentrate on his aircraft, but often the same soldier must maintain a ground vehicle.

With all the training required to effectively maintain complex aircraft and all the other training required in the Army, it is easy to see the need for some type of assistance. The recent downsizing of the U.S. military force structure, coupled with the increased operations tempo, made the assistance all the more critical. The increasing complexity of the aircraft within the Army aviation fleet further exacerbated the maintenance augmentation necessary. The Army chose to hire private companies to augment the soldiers performing maintenance. The contract maintainers have numerous advantages over the soldier maintainers. Contractor advantages include efficiency, experience, and motivated performance.

Contract maintenance is much more efficient than soldier maintenance, because the civilian contractors do not have all of the Army training distracters inherent to soldiers. Contract maintenance personnel focus purely on maintaining the aircraft. Contract employees work on the aircraft over seven hours each day. They have no requirement for physical training, Sergeant's Time, motor pool maintenance, special duty, or ceremonies. The ability of having a pure focus on maintenance is a large advantage of the privatization of Apache maintenance.

Contract personnel are usually much more experienced than soldiers. Contract maintainers can quickly develop an expertise that only the best soldiers ever obtain, because they are able to focus solely on performing aircraft maintenance. Often when given a choice between assigning a difficult maintenance task to a team of soldiers or a contract maintenance team, leaders choose the contract maintenance team. The contractor has the advantage of greater expertise and better availability during the duty day. The Army based one of the concepts to maintain the highly complex electronics systems such as the TADS, the Primary Night Vision System (PNVS) and the

Forward Looking Infrared (FLIR) on the Apache on having highly experienced contractors to perform the maintenance. The Special Repair Activity (SRA) is a contractor maintained repair facility for Line Replaceable Units (LRU). The alternative to the SRA is the Electronic Equipment Test Facility (EETF), which utilizes an expensive collection of test equipment that costs over $10 million per facility.[7] The success of the SRA is due only to the amount of experience and skill of the contract workers in the facility. With all the other tasks required of soldiers, most soldiers would never reach the experience level necessary to operate an SRA. Although using a soldier team gives the leader increased responsiveness and more control of the flow of the maintenance, overall a smaller contract team is usually more efficient because of its expertise.

The Army recognizes the expertise of the contractors to the extent that it includes garnering their expertise as part of most aviation maintenance contracts. A clause in the current Fort Campbell DynCorp aviation maintenance contract states that "the contractor shall be required to provide on-the-spot, hands-on training as the technicians inspect aircraft or components and as training opportunity arises." The contract further requires that "the focus is on imparting as much technical knowledge as feasible under the prevailing circumstances."[8] The intent, of course, is to assist in the on-the-job training of the soldiers and give them as much opportunity to learn, while working with the contractors.

Another advantage of contract maintenance is that the workers and management are performance oriented. Soldiers require a leader to motivate them to perform well, even when they are working alone. Contractors, whether at the management or worker level, receive their motivation from the knowledge that if they do not perform adequately there is someone else waiting to replace them. Most contractors are aware that the normal maintenance contract is on a two-to-three-year cycle. There is always another contractor waiting to point out performance problems in hopes of winning the contract at the next bid. At the mechanic level, they are aware that their job

depends on keeping the contract. They are also aware that even if their current company loses the contract, the follow-on contractor usually retains the best mechanics to meet his contract needs. With this motivation, workers always hustle and managers are always eager to help.

As with any other situation, anything that has advantages also has disadvantages. For contract maintenance, unfortunately there are several. These disadvantages include flexibility, standardization, and morale conflicts with the soldier maintainers.

Although contract maintenance managers will do their best to please the military customer, contract maintenance teams are not as flexible as soldiers. Soldiers can stay late, come in early, work reverse cycle, and work weekends or holidays, with little or no notice. Contractors do not provide this level of flexibility. When necessary, contract managers can make these schedule arrangements, but only when given notice well in advance. Unfortunately, aircraft do not usually break according to a certain schedule. Usually maintenance leaders do not know that aircraft will require repairs, at other than normal times, until the opportunity to adjust the contract work schedules is well past. Leaders can use soldiers for these short-notice requirements, but often the aircraft is work ordered to the contractor and soldiers cannot work on it. Or worse, the soldiers with enough experience to conduct the repairs are not available, due to the limited maintenance training time available to soldiers. This situation leaves the leader with the decision to attempt to get authorization to pay a contractor overtime or cancel that aircraft's mission. With the very limited budget resources currently available in the Army, receiving overtime authorization is extremely rare. The limited short notice flexibility of maintenance contractors and the limited training experience of many of the Army's maintenance soldiers often creates situations where required aircraft are not available for missions.

Another disadvantage to contract maintenance is that the contractor's maintenance standards and practices are not always the same as the Army's. Because of contract exemptions,

often contractors do not always follow the standard maintenance practices required of soldiers. Standard safety procedures require Army personnel to use a minimum of four personnel to move an aircraft. Contractors can move an aircraft with only one person. This may seem like a trivial matter, but it becomes a morale problem when leaders correct soldiers for violating this safety practice and then the soldier sees the contractors doing the same thing. Often Army or unit requirements call for meticulous, superfluous documentation in aircraft maintenance log books. Because such requirements hinder the contractor's speedy completion of maintenance tasks and the contract does not specifically require compliance with such procedures, the contractor may choose to ignore the Army's or the unit's requirements. Soldiers then must make the corrections in order to satisfy the Army requirement. The soldiers inevitably resent performing tasks that the Army cannot force a contractor to perform. Again this seems like childish infighting between contractors and soldiers, but it creates animosity between two groups that should be working toward the same goal. Often these seemingly trivial matters can fester into larger disagreements and can be adverse to the mission of the unit. Soldiers easily become frustrated because the training schedule fills all of their maintenance work time with other training or demeaning tasks. The contract workers are an obvious target for the soldiers' frustration because the Army allows the contractor to perform maintenance without the same distractions that a soldier must endure. This tension between the contractor and the soldier is the direct result of the Army's training system. This is another example of how training is not necessarily the cornerstone of readiness, when it comes to aviation maintenance.

The friction that can often develop between contractors and soldiers is one of several factors that causes soldier morale problems in units that work with contractors. Again, soldiers resent that the contractor enjoys the luxury of concentrating on nothing but maintenance, while the soldier must spend much of his time on other training tasks. Soldiers also resent that the contract

worker doing this job works shorter hours, has fewer distractions, and usually receives a higher salary. Most contract workers are former soldiers. This situation inevitably causes soldiers to consider whether the Army is the best employment choice for them. Many disillusioned soldiers, tired of doing everything but what they joined the Army to do, leave the Army to work for contractors. It does not take long for a newly hired former soldier to spread further dissension throughout the hangar by glorifying his job and demoralizing the soldiers.

The above describes how training affects the privatization of AH-64 maintenance. The advantages of privatization of AH-64 maintenance is the dedicated, experienced, non distracted workforce. The disadvantages are the effect on the soldier's morale and some loss of flexibility. Next, it is necessary to examine the alternatives to privatization and their effects on training factors.

There are innumerable alternatives to the current aviation maintenance system in place in the Army today. A few of these alternative solutions would have an impact on the training aspects of privatization of AH-64 maintenance. The following analysis will examine proposed mixes of privatized maintenance and soldier maintenance and will discuss the advantages and disadvantages of each. The resultant mix of contract maintenance and soldier maintenance would be the best privatization solution that allows a unit to meet the aircraft flight training requirements, while also meeting the Army's training requirements.

One alternative would be to eliminate contract maintenance at the tactical level. This would reduce the interaction of contract maintainers and soldiers, thereby eliminating any negative morale effects on soldiers. However, this does nothing to solve the problem of the soldier's lack of time to perform maintenance due to other training requirements. This solution also reduces the benefit of highly experienced workers at the tactical level. With the loss of the current contract

support and the resultant loss of experience, this solution would be detrimental to the readiness of the Apache fleet.

Another solution would be to increase the number of soldiers available to perform maintenance. This solution would allow all the current training to continue, but would increase the available maintenance man hours, when soldiers worked on aircraft, by increasing the number of soldiers. The Army utilized a form of this solution, after the initial fielding of the Apache. Readiness rates were so low for the first fielded battalions of Apaches that Congress took notice. The first Apache battalion fielded to the United States Army Europe's (USAREUR) 7th Corps recorded a 22 percent mission capable rate in January of 1988.[9] General Saint, the USAREUR commander, took action in his unit in 1990. He stripped force structure from other units to increase his Apache battalion's strength in Europe by thirty-five personnel.[10] The low Apache readiness rates and concern of commanders throughout the Army convinced the Army to permanently increase the strength of the two primary maintenance MOSs in the Apache battalion, in 1992. The 68X (armament repairers) strength was increased to thirty-eight from nineteen, while the 67R (Apache repairer) strength grew from thirty-six to sixty-nine.[11] This increased the maintenance capability of these critical MOSs by almost one-hundred percent. Under this solution, the Army could relegate contract maintenance workers to only the most highly technical jobs. This solution keeps contract experience where the Army needs it and allows soldiers to perform their maintenance mission, without sacrificing other Army training. The downside to this solution is that during the Army draw down, the probability of receiving approval for additional manned positions anywhere in the Army is not that likely. During a time period where the Army is fighting to bring its strength levels below the mandatory numbers set by Congress, it is much easier to hire a contractor than to justify another soldier.

Another possible solution to allowing soldiers to dedicate their time to training, while not sacrificing aircraft readiness is to use civilian government employees (civil servants). The U.S. Army Reserves and National Guard make extensive use of civilian government employees to maintain their helicopter fleets. Although they have soldiers assigned to the unit to perform the aircraft maintenance, these soldiers, as Reservists, are only available one weekend a month for duty. The reserve maintenance soldiers, just like their active duty brethren, spend the majority of their training time devoted to training tasks other than aircraft maintenance. Therefore, the civilian government employees are essential to keep the aircraft flying. These civil servants have all the advantages of a contract worker (full-time availability for aircraft maintenance and experience); however, their official link to the U.S. Government adds some severe disadvantages. These disadvantages include increased cost and decreased deployability. The increased cost comes with the training costs and retirement and benefits package associated with a government employee. There is also the risk of losing the trained government employee to another government job (outside the aircraft maintenance field) due to promotion. Hiring a contractor to do the same work avoids these costs. The deployability problems are because the civil service employees do not deploy overseas. The government civilian employees can deploy with the unit in non hostile environments, for additional pay, but they cannot deploy overseas. Later this study will further address the cost and deployability of contract employees. Due to the additional costs and the deployability problems associated with the civilian government employees, they are not as advantageous as hiring a contract employee.

Another possible resolution to the problem of properly maintaining aircraft, while accomplishing required Army training is to increase the number of contractors so that soldiers can concentrate on Army training. The U.S. Army Aviation and Troop Command is currently investigating a contractor logistic support concept that would contract out all aviation maintenance

for AH-64, throughout the Army. The contractor involved in this concept believes that it can provide the same level of support currently found within the Army, at a savings of 10 percent. The concept calls for the Army to split that savings with the contractor, so that the Army saves 5 percent, while the contractor receives 5 percent in profit.[12] This concept would definitely benefit from all the advantages of contract maintenance, but the soldiers would not be able to develop experience in maintenance skills. This concept would allow the soldiers to concentrate on all the training tasks prescribed by the Army training system without concern for providing aircraft maintenance support. Although this solution solves the training distracter problem for the soldiers, it has many other implications, such as cost and deployment problems. This study will examine the cost and deployment implications in a future analysis.

Although all of the above solutions have some merit, they also have many disadvantages. The best solution to support, the dual Army mission of providing ready aircraft for peacetime or wartime mission support, and trained and ready soldiers for the same, is the current system. However, the system would require some modification. The required training, as specified in figure 5, is important to ensure that commanders have prepared their soldiers for war. Commanders must temper that preparation with the realization that for numerous Army units their daily mission is their wartime mission. The Army training doctrine should authorize training requirement exemptions to units that perform their wartime mission on a daily basis. Many of the tasks that Army training doctrine requires units to train frequently are tasks that units could quickly train prior to deploying a unit to a contingency. Training for support units could be fewer training tasks such as weapon ranges, and Common Task Training, which are skills that soldiers only use during actual deployment, and more training directly related to their mission. Desert Storm proved that soldiers who had difficulty donning their chemical protective equipment, when training, had no difficulty with the concept when motivated by a true chemical threat. Aircraft

mechanics must train to maintain their primary weapon, the helicopter. Too often commanders view maintenance as "work," and work gets done when the training is over. To successfully utilize the current mix of contractors and soldiers in order to maximize the individual advantages of each, commanders must break this paradigm.[13] The best privatization solution for Apache aircraft maintenance, from the training perspective, is the current system with modifications to allow soldiers to train for their actual wartime mission by placing more emphasis on daily aviation maintenance and less on individual soldier skills.

Cost

Cost is a critical analysis criterion in any program in the Army today. With the ever decreasing budgets and ever-increasing mission requirements, leaders require thorough cost analyses. Aviation maintenance is no exception. In fact, due to the high cost of aviation operations, aviation is usually the first activity to undergo close financial scrutiny. How can aviation units justify the expense of high-cost contract maintenance, when the Army provides trained soldiers to perform many of the same tasks? To understand how Army aviation can possibly justify contract maintenance of its Apache helicopter fleet one must investigate the cost of a soldier versus the cost of a contractor.

In a 1986 compensation study, the General Accounting Office outlined the types of issues involved in such studies. The study concluded that analysts must choose a strategy to properly evaluate military against private sector pay. There are two accepted methods to properly conduct a cost analysis. These two methods are current income analysis or a life-cycle analysis. The current income analysis evaluates pay over one year, while the life-cycle analysis evaluates pay over the entire expected lifetime of the employee in that particular job.[14] Comparing a soldier's pay to the pay of a contractor's over one year hides a large amount of hidden costs to employ a soldier. This

analysis will examine aspects of both the current income and life-cycle income to most accurately evaluate the cost of a soldier versus the cost of a contractor.

At first glance the thought that a contractor can cost the Army less than a trained Apache crewman is almost incomprehensible. A contractor with the same basic skills as a 67R Apache crewman can expect to make approximately $31,000 per year working for DynCorp, at Fort Campbell, Kentucky.[15] An Apache crewman, in the rank of Specialist (E-4), with over three years experience, working in the same hangar with the contractor, makes approximately $14,500 per year, in base pay.[16] The contractor will receive even more money for overtime, weekend, holiday, or night work. The soldier will receive no additional compensation regardless of the time or day worked. To understand that in most cases the contractor is in fact cheaper, one must understand the true cost of a soldier.

There are many factors that contribute to the total cost package of a soldier. After the $14,500 in base pay, a specialist with three years in the Army can receive pay for quarters and subsistence. This amounts to an additional $7,254 per year assuming the specialist has dependents. This brings the specialist's total compensation to $21,754. This amount is still less than the cost of a contractor, but there are still numerous hidden costs to a soldier. If the soldier lives and works in a high cost area, then he will receive a variable housing allowance (VHA) to offset the high cost of off-post housing. Depending on the status of recruiting and retention for his particular Military Occupational Specialty, he may also receive enlistment or reenlistment bonuses. The Army does not currently pay enlistment and reenlistment bonuses to Apache crew members. To further add to the compensation of a soldier, an analyst must consider health insurance, pensions, life insurance, permanent change of station (PCS) costs, post exchange and commissary privileges, the cost of training and GI Bill benefits. It is difficult to accurately reach a figure that properly evaluates all the costs to the government for these benefits. Many different standards are

available to measure a soldier's total compensation. Probably the most accurate and fair standard for this study would be the Composite Army Standard Pay Rates.[17] This table shows the amount of money that the Army uses to bill other federal (non-Department of Defense) and private entities for use of the Army's soldiers. Examples of such reimbursement include the use of soldiers by the Drug Enforcement Agency (DEA) for drug eradication missions. When the DEA uses soldiers for such missions the DEA reimburses the Army based on the amount shown on the chart. A specialist (E-4) costs other federal agencies $30,349 for fiscal year 1997. Although this income is still relatively low and only slightly less than a DynCorp contractor, it is considerably higher than the original $14,500 annual salary. This chart shows that the government believes that a fair reimbursement value for a soldier is over twice his actual pay. The entire Composite Army Standard Pay Rate chart is in appendix B.

Another large cost factor to using soldier maintenance is all the initial training necessary to assign the soldier his Military Occupational Specialty. Every new Army recruit must go through basic training. During this eight-week training period, the new soldier learns all the required skills and knowledge necessary to fight and survive in the field environment. After the completion of basic training, most soldiers continue their training at Advanced Individual Training (AIT). This training gives the soldier the skill and knowledge necessary to perform in the soldier's selected MOS. The Army spends 10 percent of its total budget each year conducting this training. Depending on the complexity and length of the training the cost differs for each MOS. The latest Military Occupational Specialty Training Cost Handbook (1983) unfortunately does not list MOS 67R, Apache repairer. The MOS Training Cost Handbook does list the training cost for 67Y Attack Helicopter repairer (AH-1) as $49,378.[18] The cost of the same training for AH-64 repairers in 1996 dollars is assuredly significantly higher. Although the Military Occupational Specialty Training Cost Handbook has not been updated since 1983, the Department of Helicopter Training

at Fort Eustis, Virginia, periodically calculates the cost of training each soldier. The course administrators estimated the cost of training an Apache repairer at $11,375.[19] This cost does not include the cost of training devices, building depreciation, and installation overhead, which is included in the MOS Cost Handbook. The $11,375 is only the cost of instructor pay, food, lodging, printing manuals, and hardware used in training. The school uses twenty-one Apache aircraft at a cost of over $10 million each. If just the cost of the Apaches' depreciation were added, the training cost would increase by $35,000 per student. Training for assignment of the 67R MOS is eight weeks of AIT. This training gives the soldier the skills and knowledge in basic airframe systems, removal and replacement of aircraft components, and minimal troubleshooting skills. The Army currently trains six hundred new 67Rs each year. This amounts to a total cost of $6.8 million (using the conservative $11,375 figure from 1995) for the Army to train soldiers to maintain Apaches, annually. This is a large amount of money considering the newly trained soldiers have only the very basic skills necessary to prepare them to learn through experience at their unit. With only approximately three hours of maintenance production each day, it takes a long time for the soldier to build the necessary experience to obtain the level of performance of contract maintainers. Adding these costs to the pay and allowances of an Apache repairer raises the expenses of a soldier significantly, further justifying the seemingly high costs of contract maintenance.

Another hidden cost of soldier maintenance is the unfortunate effects of completing a newly trained AIT student's training in the unit. There is a training cost to allowing soldiers, who graduate from AIT with only the most basic maintenance skills, to finish their training at the unit level. In spite of the best intentions of the Army and unit training personnel, the new soldiers invariably make many costly mistakes. Although leaders should closely supervise all new soldiers while they gain experience on the aircraft, with the innumerable other tasks that supervisory level,

experienced mechanics have to accomplish, it is impossible to closely supervise every new soldier at every moment. Every maintenance officer in the Army can cite numerous examples of new soldiers, with good intentions, making an unfortunate adjustment that requires numerous hours and even thousands of dollars in parts to repair. This author has personally experienced having to replace an aircraft engine to correct a new soldier's misguided adjustment of one screw. Other mistakes, although less expensive in parts, can cost hours or even days to repair. Again, this author has observed units spending days realigning an aircraft transmission after a new soldier removed spacing shims without marking their original position. Although experienced maintenance personnel can make mistakes too, they are much less likely to make these mistakes because their level of experience has allowed them to avoid such pitfalls. Although no figures exist to demonstrate the cost of the Army style of on-the-job training for soldiers fresh from AIT, the costs are significant.

The organization of Apache maintenance personnel at the units that results from the need to give additional training to soldiers direct from AIT also creates hidden costs of using soldier maintainers. Most units take the new soldier from AIT and assign him to the Aviation Unit Maintenance (AVUM) company. This is the unit that performs all scheduled and unscheduled maintenance beyond the capabilities of the crew chief. The crew chief is responsible for basic services and daily inspections necessary to prepare his aircraft for flight. Any extensive services, such as a phase (five hundred hour) inspection, becomes the responsibility of the AVUM. Because of the need to have experienced maintainers to work alone on the aircraft and because the assignment as crew chief also means he receives crew member pay (an additional $150 per month), usually commanders assign crew chief slots to only the most experienced and deserving maintenance personnel. This phenomenon leaves the AVUM with all the most inexperienced soldiers to do the most extensive maintenance. Although this organization does reward the best

soldiers with additional pay and individual responsibility (their own aircraft), it leaves the most crucial maintenance to the least experienced soldiers. Phase inspections are the most maintenance intensive and time-consuming tasks for an AVUM company to perform. It involves a thorough teardown of the aircraft to allow inspections of critical areas. Although such an in-depth teardown of the aircraft allows new soldiers valuable experience, it takes considerably longer to complete with inexperienced soldiers. With phase inspections, as with most activities in the high operations tempo environment, units do not have much time. The longer the inexperienced soldiers take to complete a phase, the longer that the phase aircraft is not available for mission support or training. Again, this cost cannot be readily converted into actual dollars, but this cost is paid in reduced aircraft readiness.

Another cost-related benefit to using contractors instead of soldiers to perform Apache maintenance is the level of manning. The Army resources very few units at 100 percent of authorized strength. The Army does not man most of its units at their required manpower level because of the shortage in funding. Only the units required to maintain the highest levels of readiness are fully resourced with the required manpower. The Army uses complicated formulas (MARC) to calculate the number of mechanics necessary to support particular units and their equipment. With the shrinking personnel budgets, the MARC formulas are updated with increasingly less realistic assumptions. The current structure of Army maintenance units is calculated using a MARC assumption that each mechanic will spend 84 hours per week performing maintenance. Although it is possible to get this type of performance from a soldier during wartime, during peacetime this level of performance is unrealistic. Major General Shadley, the Ordnance Branch Chief, recently expressed his frustration with this system of calculating unit requirements when he said that,

> In my opinion, MARC is broken. . . We must be able to maintain the combat readiness of the equipment of our power projection Army in peacetime without "killing" our troops and

> "destroying" their family life! I'm afraid re-enlistment rates for CMFs 35 and 63 will begin falling, divorce rates will begin climbing ("I married you for better and for worse, but not 18 hours a day in Bravo Company!"), and we'll abuse what's left to maintain 90 percent OR rate. Our Ordnance soldiers need to do PT, weapons qualification, etc., like everyone else, but it appears there won't be time for this in high OPTEMPO units.[20]

Although Major General Shadley's comments were directed towards the ground maintenance soldiers in the Ordnance Branch, the same conditions are apparent within the Aviation Branch. Using the present MARC assumptions, a unit can maintain its equipment during war, but during peacetime, without some sort of augmentation, it is virtually impossible. Because of the unrealistic MARC calculations, the majority of Army units are working at a deficit from the start. Add to the built in deficit, the turbulence of personnel constantly rotating into and out of the unit, and all units are lucky to be manned at a level approaching 75 percent required strength.

The personnel shortage problems associated with the constant turnover of military personnel are illustrated by a snapshot of 67R strengths at the 101st Airborne Division (Air Assault). Due to the mission of the 101st Airborne Division, it enjoys the highest priority for personnel of any CONUS unit. Even with its high personnel replacement priority in January 1997 the 101st Aviation Brigade, which includes three Apache battalions, was at 91 percent strength for Apache repairers. Although this number seems to be relatively high, it included 67Rs of all ranks. Because the more senior (staff sergeant and above) soldiers are more involved in supervisory roles, such as technical inspector, and leadership positions (platoon sergeant, first sergeant), the real wrench-turning work falls to specialists (E4 and below). At E4 and below, the 67R strength in the 101st AVN BDE was 106 on hand, of 126 authorized, or 84 percent. Nine of the 106 on-hand soldiers were scheduled to Permanently Change Station (PCS) in the next 30 days and their replacements were yet to arrive at Fort Campbell.[21] Because the last month of any soldiers assignment is virtually lost to preparation for a PCS, the 101st actual working strength of 67R10s is at 77 percent. If the Army's highest priority units are working at only 77 percent strength of

wrench-turning mechanics, imagine what other units must endure. This 77 percent availability can be even further reduced by special duty requirements, as discussed earlier, and soldiers not available for duty. The "not available" status applies to soldiers who are pending administrative release from the Army, Medical Review Boards (MRB), or soldiers who are pregnant. A snapshot of the three Apache battalions at Fort Campbell, Kentucky, in January 1997 showed seventeen not available soldiers (five each in two battalions and seven in the last battalion).[22] The special duty soldiers removed another eight soldiers from the three battalions. The twenty-five soldiers lost to special duty and not available status represents a full 10 percent of one Apache battalion's authorized strength. Looking at these indicators it is easy to see that the average unit is lucky if it has 70 percent of its authorized strength on hand for maintenance duty each day.

Contractors, of course, provide personnel to work according to the contract. Therefore, when the Army hires a certain number of contract workers, it gets that amount of production in the hangar. When a unit uses only soldiers for maintenance, it can expect to always be shorthanded. The increased operations tempo throughout the Army, combined with the built-in manpower shortages among soldiers, makes the use of contract maintenance essential for units to complete its required missions. The maintenance contracts for aviation maintenance provide for a set number of man-hours per year. The contractor is responsible to provide a certain number of hours of maintenance per year. Therefore, if a contract employee misses a workday for any reason the Army does not loose any productive maintenance time, because the contractor must provide a substitute employee or work other employees longer to make up the lost work hours. Because the unit gets one contract worker for a specified time period, for each requirement (instead of an artificially reduced percentage of required soldiers) the cost conscious unit will always select a contractor.

With all the pay and benefits that a soldier receives, combined with all the hidden costs of lack of experience and inefficiency, the benefits of a higher paid contract worker is easy to see. At Fort Campbell, Kentucky, the aviation maintenance contract provides 182 contractors at a total cost of $10,572,286 per year.[23] This cost averages out to $58,089 per employee. Considering that a conservative cost estimate for a inexperienced soldier is $40,000, the $58,000 cost of an experienced maintainer seems a little expensive. Considering that the soldier will actually work on the aircraft an average of less than three hours each day, while the contractor provides at least twice the actual maintenance production time, the contractor is well worth the added expense.

It is easy to see the benefits of contract maintenance when measured in dollars. Contract maintenance, in pure dollars, although expensive, is not nearly as expensive relative to the cost of soldiers performing the maintenance. After factoring in the additional hidden costs of inexperience and inefficiency, the contractor is an even better deal for the Army. The Army, of course, needs to keep some level of soldier involvement in Apache maintenance. As effective as contract maintenance may be, there are still numerous tasks for an Apache maintenance soldier to perform. It would be cost prohibitive to replace every soldier with a contract worker. In addition, there are innumerable situations where contract maintenance may not be available, such as when the aircraft is operating away from its home station. The question then becomes how to increase the training, experience, and efficiency of the Apache maintenance soldier, while maximizing the positive attributes of an experienced worker. The Army has several programs that attempt to increase the experience and efficiency of the soldier maintenance personnel through the experience and training of a few individuals. These programs include the Logistics Assistance Representative (LAR) Program, the Life Cycle Contractor Support Pilot Program and the Contractor Field Service Representative Program (CFSR).

The Logistics Assistance Representative is not a contractor, but a federal employee who has extensive training and experience in Army logistics systems. The LAR is usually a former soldier with experience in the system that he supports or a civil servant with similar experience supporting that system throughout his career. The Army assigns a LAR to a certain location based on the density of systems to support in that area. Currently, the Army has positioned one LAR to provide support for each AH-64 battalion in the Army. The LAR does not provide any actual wrench-turning assistance. The LAR provides assistance to the unit through his experience, training, and reference assets. When a unit identifies a particular aircraft problem for which they require assistance, they alert the LAR. The LAR then evaluates the problem, if he cannot solve the problem himself, he has extensive resources to reference. He has connections to and understands the logistics and technical support systems throughout the Army. He also has critical links with commercial vendors who support the aircraft. At least this is the way the Army designed the LAR program to function. Unfortunately, with the continuously changing technology and the decreased funding available throughout the Army, the LAR program is not currently working at maximum efficiency. A recent Apache Operating and Support Cost Reduction Process Action Team meeting at the Army's Aviation and Troop Command identified several deficiencies with the current LAR program for Apaches. These program deficiencies include limited funds for factory or technical training, limited access to technical documentation, and limited access to design personnel.[24] The decreasing effectiveness of this program is the result of technology outpacing funding for additional training and resources. Improving the LAR program to return it to its original effectiveness, by increasing the training funding to educate the LARs enough to keep pace with technology, would be an effective method to improve the experience and efficiency to field units, without increasing the amount of contract support.

Another method to reduce the amount of actual wrench-turning contract maintenance workers necessary, while increasing the experience level and efficiency of maintenance soldiers is the CFSR. The CFSR is a contractor who provides maintenance and other logistical advice on specific crucial, high cost, and maintenance intensive components of the aircraft. McDonnell Douglas currently has fourteen CFSRs supporting Army units. According to McDonnell Douglas these CFSRs saved the Army over thirteen million dollars in 1996 through cost avoidance.[25] The CFSR's expertise prevented units from turning in good parts for repair or simply assisted the unit in accomplishing a repair. Because the CFSR is a contractor, with direct links to the manufacturer, the difficulties currently experienced by the LAR do not affect the CFSR. The CFSR has the factory technical training and has access to the technical documentation and design personnel necessary to make his support effective for the Army. In fact, the same Process Action Team that sited the deficiencies with the LAR program identified strong field unit support to retain and even expand the CFSR support already in place in their units.[26]

Obviously, when properly trained and backed by the proper technical reference system, a representative, whether LAR or CFSR, is valuable to units. This readily available, experienced logistic support resource can reduce maintenance costs by increasing the efficiency and knowledge level of maintenance soldiers, without the need to hire numerous hands-on contractor maintenance personnel. This method of maintenance support makes efficient use of limited maintenance funds by maximizing the experience of experts, while allowing the soldiers to do the actual wrench turning.

As measured by cost alone, contracting aviation maintenance is a viable alternative to using solely soldiers to perform maintenance. Privatization of contract maintenance gives the Army the added efficiency and experience of contract workers to supplement the soldier

maintenance workforce. The contractor can provide these benefits at a low cost relative to the life-cycle costs of a maintenance soldier.

The disadvantage of the use of the contract worker is that the Army's initial training funds for training soldier maintainers are virtually wasted, due to the reduced amount of on-the-job training. Although when measured against a seasoned contractor, the inexperienced soldier straight out of AIT is a less valuable maintenance asset, his value increases tremendously when the contractor is not available. Many situations require the Army to do things, which the contract does not cover. Whether it is a deployment to a far corner of the world, or just a requirement to work on a weekend, the soldier is always available, even when the contractor is not. Over dependence on contractors can cause the new soldier to not receive any aircraft maintenance on-the-job training at the unit level. Before long, the soldier loses the minimal skills that he developed in AIT and the Army loses the money that it invested to train a soldier. Although the use of contract maintenance can save the Army money when measured by equipment readiness, it may actually cost the Army much more in soldier readiness.

The most credible alternatives to contract maintenance of the Apache fleet are 100 percent soldier maintenance, improved LAR support, or improved CFSR support. The benefits of expertise and efficiency at a relatively low cost justify the use of some level of contract maintenance support, therefore the 100 percent soldier option is not desirable. The LAR support system adds experience to soldier maintenance and may be an effective system, if the funding for factory training and data is available. The CFSR system currently in place has the same advantages as the LAR system, with the benefit of up-to-date training and information. A disadvantage to the CFSR system is that a different CFSR would be necessary for each different major subsystem on the Apache. The requirement for multiple CFSRs could negate any of the cost benefits of the program.

Ultimately, from a cost perspective the current system has merit. There are several changes that would maximize the value of the available systems. The Army must continue to train soldiers to perform aircraft maintenance. The soldier is the Army's mainstay. The soldier will work on aircraft anywhere, at any time, under any conditions, for the same pay that he receives every day. The other alternatives are not nearly as flexible. To maximize the value of the soldier, in maintaining aircraft, he must receive the essential on-the-job training to build his experience base. Commanders must also reduce the distracters to soldiers performing aircraft maintenance. Allowing the soldier more time to perform aircraft maintenance has numerous advantages. First, this provides the opportunity for inexperienced soldiers to gain experience. This builds the depth of experienced soldiers. Second, if soldiers are performing more maintenance, the requirement for contractors is reduced. This produces a direct cost savings by only reducing the amount of requirements on the aviation maintenance soldier. The Army should retain the LAR as a stable knowledge base of maintenance information. The Army could enhance the LAR's value by providing additional training funds to keep his general knowledge up to date. The CFSR also provides a valuable tool to the unit by providing highly technical, system specific information to enhance the capabilities of the soldier. With these suggested changes, the current system would provide the Army with the best maintenance available for its Apache fleet at the best price.

Readiness

Readiness of the Army aviation fleet, especially for the Apache, is an extremely critical issue for the Army. The proven lethality of the Apache on the battlefield and the large investment in this weapon system have everyone from Congress to Army commanders closely following its readiness levels. Although the Army designed the Apache to be an aircraft maintained primarily by soldiers (below depot level), the Army's need to increase the readiness of the Apache fleet

necessitated the introduction of contract workers. The decision to hire contractors to perform Apache maintenance, below depot level, becomes a decision of whether the cost is worth the increased readiness that it produces. The number of contractors hired by division commanders throughout the Army is a testament to the value that commanders put on the readiness of Apache aircraft and the ability of contractors to increase readiness rates.

Readiness Reporting

To properly interpret the readiness rates of the Apache, it is first necessary to understand the readiness reporting system. Army Regulation 700-138 defines the aviation readiness reporting procedures. While the Army measures the readiness of ground vehicles in days, it measures the readiness of aircraft in hours. Therefore, if a pilot or maintenance worker identified a fault on an Apache at 0800 hours and maintenance did not repair it until 1400 hours the same day, then that aircraft's readiness for that day would be 75 percent. There are also numerous levels of readiness. An aircraft is fully mission capable (FMC) if it can perform all its designated missions. If an aircraft system, designated by AR 700-138 as mission essential, is not operational, even if the aircraft itself is operational, then the aircraft is designated as partially mission capable (PMC). The failure of numerous separate systems on the Apache can render the aircraft PMC. Figure 6 shows these systems. If the aircraft has a fault that renders it not fit to fly, then it is not mission capable (NMC). Not mission capable time is further divided into not mission capable for supply (NMCS) and not mission capable for maintenance (NMCM). The Army readiness standard for Apaches, according to AR 700-138 is 70 percent FMC, with no more than 5 percent PMC time. Adding the PMC time to the FMC time yields the Army goal for the mission capable (MC). This goal is 75 percent.

Using the reporting system specified in AR 700-138, all aviation units track readiness by individual aircraft. The individual aircraft readiness is then rolled up into an overall battalion readiness rate, by aircraft type. All Army Aviation battalions forward their aircraft readiness rates, aircraft flight times, and major reasons for not reaching the Army readiness goals to their major command.

Figure 6. Systems Required for a Fully Mission Capable Apache

Soon after the initial fielding of the Apache, readiness shortcomings became evident. Even though the readiness standards for the Apache were 10 percent lower than the standards for older type aircraft, such as the UH-1 and the OH-58, it was not reaching the lower standards. In a General Accounting Office report completed in 1990, the GAO found that the eleven Apache combat battalions fielded averaged a 49.9 percent fully mission capable rate from January 1989 through April 1990. The GAO study also found that the Apache fleet did not meet the Department of the Army readiness standard from 1986 through April of 1990.[27] Although any new system is likely to experience some readiness problems while the "bugs are worked out," the consistently low rates suffered by the new Apache fleet were particularly troubling.

The low rates were even more troubling due to the low flight hours on the aircraft. As with any system, the more it is used, the more likely it is to require maintenance. Because the Army was still in the process of fielding the Apache, the flight hours were relatively low, when compared to the hours flown after the completion of fielding. Even under relatively light use, the Apache fleet could not meet readiness standards. As the Apache fleet accumulated more flight hours, the readiness rates declined even further. The GAO study found the effects of flight time on readiness rates were dramatic. They analyzed the effects of accumulated flying hours and found that as the original eleven fielded battalions each had accumulated at least five hundred hours the Apache fleet averaged a 67 percent fully mission capable rate. Six battalions had flown at least 5,500 hours, and they averaged a 49 percent readiness rate. The two battalions that had flown over 10,000 flight hours averaged only a 37 percent readiness rate.[28] Such low readiness rates during the fielding of the Apache, and the lower rates as units accumulated flight time, caused Congress to examine the problems with the Apache's readiness. What they found is that the logistical support structure that the Army built to support the Apache was flawed in numerous ways. The flawed logistics support structure was the reason for the readiness failures.

Contractors Required to Overcome Army Manning Shortages

To understand why commanders believe that contractors are the solution to raising their readiness rates, one must first investigate the reason contractors are necessary at all. Early in the Apache development cycle, the General Accounting Office (GAO) identified that the Apache was difficult to maintain logistically. However, the Army never slowed the Apache procurement program to investigate or resolve any of these potential support problems. The GAO theorizes that, "the persistence of basic logistical support problems after the bulk of production has been completed suggests that production took priority over logistical supportability."[29] As is often the

case, the Army may have been too fixated on producing its new, high-powered weapon system, without completely resolving its supportability problems. During the initial development of the sustainment plan for the Apache, the planners made numerous flawed assumptions that were to affect the Apache.

Apache Support Structure Built with Many Faults

The first fault with the Apache support structure was the size of the maintenance organizations. When the Apache (and the units designed to maintain them) were first fielded, they experienced low readiness and low morale. Because the maintenance units were undersized for their required work-load, they had to spend many additional hours to bring readiness rates even to a marginal level. In 1989, the Commander of U.S. Army-Europe depicted the Apache maintenance situation as follows: "Current readiness rates are only possible through a combination of reporting procedure shortfalls, existing contract support, LAR and CFSR assistance, and the extensive overtime contributed by our soldiers. . . . Initial data shows a serious morale and re-up problems starting to occur in these units due to overwork."[30] This commander recognized that the readiness levels that he was receiving from his units were gained at the expense of his soldiers' morale. The Army developed the maintenance manning level for the Apache using the requirements of the AH-1 Cobra. The Cobra, being an older model attack helicopter, was much less complex and less maintenance intensive. The "Army of Excellence" initiative made the maintenance organization designed for the Cobra austere, for even this less technologically advanced aircraft. Using this model for the highly complex and technical Apache resulted in a truly anemic unit, not capable of properly maintaining the Apache.

The original Apache battalion had 264 people authorized, about 100 of whom are relegated to performing unit level maintenance. According to the Army's manpower analysis for

the Apache, the battalion should have 366 people, with 160 performing unit level maintenance.[31] However, even that level of manning is probably insufficient due to the flight hour planning factor used. The 366 manpower requirement is based on each Apache flying only two flight hours per day. The Staff Officers' Field Manual Organizational, Technical, and Logistical Data Planning Factors (FM 101-10-1/2), which is the field manual used to calculate many logistical planning requirements, tells staff officers to plan on four flight hours per day.[32] This planning factor is what logisticians use to estimate the fuel and parts requirements for the aircraft. If the Army used the same planning factors for personnel, the number of maintenance personnel authorized in the unit would be significantly higher.

Another key planning factor that the Army utilizes to determine personnel requirements is the maintenance man-hour per flight hour ratio. This ratio is the amount of maintenance that the aircraft requires for each flight hour. The figure that the Army used to determine the maintenance manpower requirements for the Apache was seven maintenance man-hours per flight hour. This figure is also quite suspect. The original contract specifications for the Apache required that the aircraft have a maintenance to flight hour ratio of eight-to-thirteen man-hours per flight hour. Army test data showed mean time between failure rates ranging from 3.5 hours to 6.4 hours on tests conducted between 1981 and 1989.[33] Unfortunately, these tests narrowly defined the requirements of a fault to be counted during the test. For the purposes of the tests, the Army defined mission reliability to include only failures that (1) are caused by hardware, (2) occur in flight, and (3) cause a mission to be aborted.[34] Because these definitions are significantly different from the reporting requirements defined in the Army's readiness reporting regulation, it is easy to see the disconnect between the number of maintainers required and the readiness rates produced. The unrealistic maintenance man-hour per flight hour ratios produced by these ill-defined tests are even more incredulous when compared to aircraft from other services. Figure 7 shows an example

of the Navy and Marine Corps aircraft maintenance man-hour to flight hour ratios. This figure shows just how unrealistic the maintenance man-hour per flight hour ratio developed for the Apache might be. Although none of these aircraft fully approximate the Apache, they do show the amount of maintenance required for significantly less complex aircraft to be much higher than the factors used by the Army. The lowest ratio in the figure is fifteen maintenance hours to each flight

Aircraft	Maintenance man-hours per flight hour
A-6E Intruder (fixed wing)	53.8
A-7E Corsair (fixed wing)	43.9
F/A-18A Hornet (fixed wing)	30.9
F-14A Tomcat (fixed wing)	61.4
AH-1W Sea Cobra (helicopter)	15.0
UH-1N Huey (helicopter)	16.3
SH-2F Sea Sprite (helicopter)	30.2
SH-3H Sea King (helicopter)	37.2
CH-46E Sea Knight (helicopter)	18.5
CH-53E Sea Stallion (helicopter)	39.1
SH-60B Sea Hawk (helicopter)	21.0
P-3C Orion (fixed wing)	26.4
S-3A Viking (fixed wing)	45.5
AV-8B Harrier (fixed wing)	19.6

Figure 7 - Maintenance Man-Hours per Flight Hour for Navy and Marine Corps Aircraft. Source: General Accounting Office, Apache Helicopter: Serious Logistical Support Problems Must Be Solved to Realize Combat Potential (Washington, D.C.: U.S. Government Printing Office, 1990), 67.

hour for the aircraft the Apache was designed to replace, the AH-1, which is a 1960s era helicopter. It is impossible to believe, even with maintenance technology advances, that the maintenance man hour ratio for the Apache could be less than one-half of the aircraft it replaced. The Apache maintenance man hour to flying hour ratio average for the Army as of April 1996 (ten years of system refinement after the fielding of the first Apache) is 10.86 to one.[35] These obviously

flawed Apache manpower requirements figures were based on restrictive definitions of faults, while the faults reported for readiness purposes are much more broad and all encompassing.

The maintenance organizations built using this data were further hindered by other faulty assumptions in the testing. The Army only counted actual direct maintenance time (wrench turning) in its calculations. The time required for consulting maintenance manuals, locating tools and parts, managing maintenance, performing test flights, and providing support, such as ammunition loading, was not counted.[36] The time required for all these tasks is actually a large part of aircraft maintenance. Not allocating additional time and personnel to accomplish these tasks is a major flaw in any test to establish maintenance manpower baselines. The GAO study demonstrated the poor assumptions that the Army used to build the database to justify the size of its maintenance units by using the Apache maintenance contract at the Army's aviation school, in Fort Rucker, Alabama. In 1990, the aviation school used contractors to maintain fifty Apaches. The contractor estimated that his crew expended approximately twenty maintenance hours for every hour flown. Using the Army's testing definitions of maintenance, the contractor would only expend about 14 hours of maintenance per flight hour. The Army's definition of maintenance used in testing hides almost one-third of the actual maintenance requirement. The GAO also claimed that the Army's data in the tests was incomplete because it did not conduct any Apache phases during the test and because contractors helped maintain the aircraft during the test.[37] Phase maintenance is the most maintenance intensive task for any aviation maintenance unit. Aircraft downtime due to phase maintenance easily accounts for at least 10 percent of all aircraft maintenance requirements. Using contractors to establish maintenance-unit manning parameters further skews the Army's maintenance manpower requirements, because of the experience and skill advantage that the contractor has over the average soldier.

Comparing the Army's manning of Apache maintenance units to other services' manning of aviation maintenance units further demonstrates the shortage of personnel in the Army's Apache maintenance units. Because only the Army has Apaches, it is not possible to compare that particular airframe in other services. However, all three services fly versions of the UH-60 Blackhawk helicopter. The Army just recently upgraded its flight crew requirement for this aircraft from three to four. The Air Force provides thirteen personnel for the same aircraft, while the Navy uses a crew of eight. This amount of manning for both the Air Force and the Navy reflects their philosophy of providing more than one crew per airframe, while the Army only provides one. However, this philosophy also provides the other services with significantly more aircraft maintenance assets than the Army has available. Therefore, the Army is resourced with the smallest crew and the least robust maintenance capability.

Due to the faulty data used to develop the manning levels of maintenance units, contract maintenance became increasingly critical to increase the readiness of the Apache. Contractors gave the Army a relatively low cost, stable, experienced maintenance capability, without the pain of admitting that the initial Apache readiness data and the resulting maintenance unit structure were flawed. The Army hired contractors for various reasons throughout the Apache development process for specific programs. However, once the Army realized the utility of using contractors to improve readiness, they were slow to release them, even after the program they supported was complete. There are numerous examples of the Army retaining contractors beyond the limits of the particular program for which the Army hired them. Contractor technicians, whom the Army hired to provide initial support to newly fielded Apache battalions, are now permanent fixtures in every battalion. Once they proved their value to the new battalions, the units deemed them essential to increased readiness and justified their permanent existence. The same was true at Fort Hood, in May of 1989. The Army hired a contractor to assist in the repair of the large number of Apaches

damaged by an intense wind storm. The Army retained that contractor to augment the intermediate maintenance units in performing routine repairs. The Army originally fielded Special Repair Activities (SRAs) to alleviate production problems with the targeting and night vision systems. Every major Apache unit location now has its own SRA.[38] The process of hiring contractors for a specific purpose and retaining them seems to occur at every possible contracting opportunity. After the end of Operation Desert Storm, the Army hired contractors to perform a Special Technical Inspection and Repair (STIR) program on all aircraft that had deployed to Southwest Asia. This program ended in 1993. At many installations contractors hired to perform the STIR program are still working today. The increases in readiness and the decreased burden on soldiers are obviously worth the extra expense at many installations.

The Army, as a whole, is almost blind to the level of contract support provided to its aviation fleet. Although the Army spends enormous amounts of money to hire contractors, in order to increase readiness, individual installations are paying the contract bills. The division commander at the installation is willing to spend his own flying hour funds to improve his aircraft readiness. However, at the Aviation and Troop Command, (ATCOM, the command with the responsibility to improve and sustain aircraft readiness), they do not have visibility of the amount of contract support paid for at the installation level. ATCOM's official view of contract support is that it is not necessary. ATCOM believes that soldiers should provide the unit-level and intermediate-level support for the Apache. ATCOM hires contractors for the Apache fleet only to provide special modifications called modification work orders (MWO) to the entire fleet or at least large portions of the fleet. All the contractors hired to perform unit-level or intermediate-level maintenance at individual installations throughout the Army are paid for at the installation level. This is a decision made by the installation (usually a division commander). These leaders and their

staffs have determined that the increase in readiness that the contractors provide their aircraft fleet is worth the expenditure of the training dollars to hire them.

Contractor's Contribution to Apache Readiness

The question then is what is the division commander getting for his fund expenditure? Doing a comparison of readiness level payoff per contract dollar spent is difficult due to the various ways in which individual installations employ their contractors. Most individual installation maintenance contracts do not contract a specific number of contract employees for a specific type of airframe. Installations usually place their contractors at the intermediate level of maintenance in order to provide support to numerous different aircraft types in numerous different units, with the aviation intermediate maintenance (AVIM) unit to screen and prioritize the work. The AVIM then directs the efforts of contract employees towards the particular aircraft or particular unit that has the priority for support, as determined by the AVIM Production Control Section. However, in some cases the Apache has such a high priority that the installation set up the contract to provide a specific number of contractors to each Apache battalion. Although there are various levels of contract support at each installation, and the installations employ their contractors differently at each location, the below chart shows the changes in readiness levels over the years. Although the exact numbers of contractors working on the Apache over the life span of the aircraft, at each location, is difficult to assess; generally, the level of contracting has slowly increased over the lifetime of the aircraft. The readiness rates of the Apache are shown in appendix C. Note the initial poor readiness levels experienced by the Apache in its early years. During its first year, the Apache averaged only sixty-one percent FMC. The first year's poor start was followed by a disastrous second year of only forty-nine percent FMC, despite the reduction in flight time by an average of twenty-five hours per airframe. In 1990, buoyed by wartime funding and

maintenance man hours, the Apache still missed the FMC standard of seventy percent (by just over two percent), while reaching its highest flight hour per aircraft average to date. The recovery of the aircraft fleet from the war is evident in the slightly lower readiness in 1991, with a significant reduction in flying hours per airframe. The Apache finally surpassed the FMC standard for the first time in 1992 (by less than half a percentage point). It is not by coincidence that this was the year that the Army doubled the number of Apache repairers and armament specialists (MOSs 67R and 67X) in an Apache battalion. The significance of the contractor's contribution to readiness is evident by comparing the statistics over the last two years, with the aircraft's performance in its first two years. In 1988-1989 the Apache averaged an FMC rate a full fifteen percent below the standard, while flying an average of 137.2 hours per airframe. In 1995-1996, the Apache flew 15 more hours per airframe, while maintaining an FMC rate five percent above the standard. The slow increase of civilian contractors supporting the Apache over the years has significantly effected the overall readiness of the aircraft.

It is interesting to note that at the 101st Airborne Division (Air Assault) when Major General Keane (now LTG Keane, commander of XVIII Airborne Corps) was the division commander, he raised the Apache fully mission capable (FMC) standard (goal) to 80 percent. The following division commander Major General Kernan maintained the increased readiness requirements for the Apaches. This standard of readiness was a full 10 percent higher than the Department of the Army standard provided in Army Regulation 700-138. In order to assist his units in maintaining such a high standard, he raised the number of contractors assigned to each Apache battalion from two to five. With the additional contractors, each of the three Apache battalions, in the 101st Aviation Brigade has a team consisting of three mechanics, one electrician, and one sheet metal repairer. These dedicated contractors were further aided by the pool of sixteen other general support Apache mechanics available to support the 101st Aviation Brigade. Out of a

total of 182 aviation maintenance contractors supporting the 101st Aviation Brigade, 31 provide direct support to Apaches. The readiness rates of the Apaches, which was averaging about 75 percent, rose to just over 80 percent.[39] Although this amount of support is bound to produce results, it is easy to see that just a few extra hands to work a full day on the aircraft can increase readiness by 1 to 2 percent per contract worker or contract worker equivalent.

This evidence from Fort Campbell shows that the commander is getting increased readiness of a proven lethal weapons system for his investment in contractors. The contractor is now the solution to the government's self-created problem of Apache readiness shortfalls. Although it is arguable that increased availability of soldiers for maintenance tasks would allow the soldier to gain the experience to produce the same results, this solution was not a viable alternative during the downsizing of the Army force structure. With all the constraints on the soldier that do not allow him to contribute his full maintenance capabilities to the readiness of the Apache, the liberal use of contractors is probably the best answer to readiness requirements.

Deployability

With the decreasing amount of United States troops forward deployed, power projection has become an increasingly important part of the Army's mission. In order to protect the vital interests of the United States anywhere in the world, the United States military forces must be ready to deploy, on short notice, from their continental United States (CONUS) bases to the area of operations. The ability to deploy and sustain CONUS-based forces rapidly is increasingly essential to meet U.S. national security objectives. To meet this goal the military has placed increased emphasis on prepositioned equipment. The days when units took weeks or months to prepare, load, deploy, and unload equipment for contingencies, beyond the reach of U.S. forward based troops, are in the past. Now CONUS based troops can (and have) routinely deploy with less

than a weeks notice. Troops can rapidly deploy with little equipment and meet equipment that is prepositioned or moved to the area on ships. In order to be successful in such an environment, the forces necessary to sustain combat forces must be an integral part of the initially deployed forces. Although deploying units can eventually build the sustainment structure necessary to support a contingency operation, initially the sustainment structure is rather meager. Rapidly deployed combat units must be capable of supporting sustained operations with internal assets.

As was proven in Operation Desert Shield, Apache attack helicopters are apt to be among the first units called upon to deploy to deter a heavily armored threat. With the ability to self-deploy across the Atlantic Ocean, CONUS based Apache units could deploy for a contingency operation even without Air Force deployment assets. Being ready to deploy and sustain operations anywhere in the world is essential for any Apache unit, regardless of where they are currently based. The most critical portion of the sustainment mission for an Apache unit is the maintenance of its aircraft. Without flight worthy aircraft, the unit cannot effectively support its mission. Therefore, a well-trained, rapidly deployable, maintenance capability is essential to enable an Apache unit to adequately support its mission.

Although there are some host nation support personnel available with the prepositioned equipment, their focus is on removing equipment from storage and issuing it. They also lack experience on repairs on operating aircraft. It is therefore imperative that a fully trained maintenance capability deploys with the unit. With the increasing reliance on contract maintenance at the unit level, the ability of soldiers alone to provide the maintenance support for their aircraft is in question. The experience level of the soldiers, who have worked in the shadow of contractors, is probably not developed well enough to fully prepare the soldiers to sustain contingency operations, without additional assistance. The existence of contractors at the unit level is primarily to fill the manpower shortages of the Apache unit structure and to assist in maintaining the complex Apache

aircraft systems. Although on a contingency operation, soldiers would not be burdened with the normal garrison training requirements that usually reduce the time they have available to work on aircraft, their previous dependence on contract maintenance decreases their experience. Unless the Army reduces its current dependence on contract maintenance, it is necessary to deploy the maintenance capability that is available in garrison on any contingency operation for a unit to be truly prepared for its mission. Therefore, units must consider the deployability of any contract maintenance worker to ensure that they are fully ready for deployment.

Deploying a contract worker may seem to be a complicated matter, but actually most Apache support contracts make it relatively simple. To insure that a contractor, who provides maintenance support in garrison is also available to provide that support anywhere, under any conditions, requires only several key clauses in the initial contract. As long as the necessary clauses are included, then the contractor will deploy with the unit. The government incurs additional costs in the contract in the form of per diem and hostile environment pay. Many of the current contracts in place include the provisions to deploy contractors. For example, at Fort Campbell, the 101st Aviation Brigade maintenance contract, with DynCorp, provides provisions for contractors to deploy overseas with their units; however, there is no provision to deploy contractors within CONUS.

The Use of Contractors in Hostile Environments

With the United States military downsizing, the number of combat service support forces on active duty has significantly declined. The Reserve Components now make up over 65 percent of the total military mobilization manpower.[40] The vast majority of the reserve component is in the combat support and combat service support areas. Therefore, reserve units will provide a large portion of the maintenance support for contingency operations. Because it may take months to

mobilize and deploy Reserve Forces, an initial maintenance sustainment capability for deploying active forces is all the more crucial. Because mobilizing and deploying reserve forces can be a timely and costly endeavor, the Army is turning to contracting for much of its combat service support needs. The Department of Defense demonstrated its commitment to deploying contractors to contingencies when it created the Logistics Civil Augmentation Program (LOGCAP) to provide an on-the-shelf capability to support military contingencies worldwide. LOGCAP is a contract that provides a civilian support force of 20,000 in five different support areas, when necessary. LOGCAP has supported missions in Haiti, Saudi Arabia, Somalia and Rwanda. DynCorp, the same company that provides a large amount of the contract aviation maintenance services to the Army, recently won the 1997 (five year) contract for LOGCAP. This growing requirement for contractors, in contingency areas, makes it more likely that contractors will deploy to a hostile environment to provide support to the Army.

Although the use of contract workers in a hostile environment may seem to be a concept born to recent events, the use of contract workers in conflict is extensive. Historically, the Army has used contract workers in World War II, the Korean War, Vietnam and most recently in Desert Storm.[41] In World War II, contractors were used extensively for port operations in support of the Normandy Invasion. Korean contractors provided port services, road construction, depot maintenance and railroad maintenance. In Vietnam over 30,000 civilians provided almost all theater level support.[42] Although it appears that the use of contractors in these armed conflicts set the precedent for use of contractors in Desert Shield/Storm, contractor employment in today's environment is much different.

In all the past conflicts, contractors worked in support roles in rear areas. The new role of civilians (including contractors) in future conflicts was defined in the Department of Defense's report to congress on the conduct of the Persian Gulf War. The report stated that:

> Many roles have been transferred to the civilian sector from the military because of force reductions, realignments and civilianization efforts. Civilians employed in direct support of Operations Desert Shield and Desert Storm were there because the capability they represented was not sufficiently available in the uniformed military or because the capability had been consciously assigned to the civilian component to conserve military manpower. It seems clear that future contingencies also will require the presence and involvement of civilians in active theaters of operations.[43]

This report described the situation within Apache units fairly accurately. The units that deployed to Desert Storm required the same contract support in conflict as it did in garrison.

In Operation Desert Storm, AVSCOM (the agency now known as ATCOM) had 655 civilian contractors working to support aviation systems at the start of the ground war.[44] These contractors provided support at three primary locations Dharan, Abu Dhabi, and King Khalid Military City. Contractors performed phase inspections, armament support, engine and component servicing, structural repair, airframe repair, painting, rotor blade and hydraulic system care and avionics maintenance on Apaches and other helicopters from these three locations. These contractors were deployed to provide support to the aircraft shown in figure 8.

AIRCRAFT	# DEPLOYED	HOURS FLOWN	READINESS RATE
AH-1	145	10,000+	85 percent
AH-64	274	18,700+	87 percent
CH-47D	163	13,700+	78 percent
OH-58D	132	8,700+	85 percent
UH-60	489	44,000+	82 percent

Figure 8. US Army Aircraft Performance in Operation Desert Shield/Storm. Source: Department of Defense, Conduct of the Persian Gulf War (Washington: Department of Defense, 1992), 661.

The mission capable rates of these aircraft in such a harsh environment are impressive. However, the ratio of one aviation contract worker to every two Army aircraft shows the level of dependence on contract support to achieve such readiness.

Unfortunately, the transition from garrison operations to war, for contractors, is not always a smooth one. The Army experienced difficulties deploying the contractors whom the Army has come to depend upon to Operation Desert Storm. After Operation Desert Storm, leaders identified numerous problems with the deployment of civilians to a hostile environment.

One significant problem was the loss of unit integrity. Because civilians traveling to Southwest Asia were given a different movement priority than military, they often experienced extensive delays in rejoining the unit they supported. Delayed deployment of contractors could have serious readiness implications during the maintenance intensive deployment of an Apache unit. The unit dependence on contract maintenance could cause an Apache unit to deploy aircraft, which they cannot adequately support, until the arrival of their contract support.

Another problem with the use of civilians identified during Operation Desert Storm was the guidance for treating civilian war zone casualties. The DOD's report claimed that the guidance for dealing with civilian war zone casualties "lacks the specificity provided by the Services for handling military."[45] Although contractors are almost an integral part of many units, the guidance for providing medical and other essential support is lacking. The threat of a chemical attack in Operation Desert Storm left contractors at risk without the training or equipment that was standard for the soldiers working with them.

The Department of Defense identified numerous other potential problems with the deployment of civilians to a hostile environment. These included the identification of civilians with a standard identification card. Without standard identification procedures, the movement of civilians through military checkpoints was often difficult. The status of civilian contractors in the event of capture was also a concern identified soon after the end of Operation Desert Storm. Two contractors inadvertently strayed into Iraqi territory and the Iraqis took them prisoner. As civilians, they are not afforded the same treatment as prisoners of war, as is a soldier.

The extensive use of contractors in Operation Desert Storm and the statements in the DOD's after action report make it clear that contractors are an integral part of the military support structure. The Army plans to continue using contractors to provide support in peacetime and in war. The introduction of aviation maintenance contractors in Operation Desert Storm was an afterthought. Now units are planning on the immediate deployment and use of contractors during the next conflict. Units with the highest readiness requirements realize that they will need the contractors to be fully ready in the next war and have made provisions to deploy them immediately. The 101st Airborne Division plans to take its aviation maintenance contractors with the units they support. These contractors will deploy with the unit to the intermediate staging base. Although doctrinally this area is out of immediate enemy range, contractors will be found much farther forward, much quicker than in any conflict in history. Resolution of the difficulties that the DOD identified after Operation Desert Storm will improve the support that contractors are able to provide during the next conflict.

With the need to quickly deploy a combat ready Apache unit to contingencies worldwide, on short notice, deploying the contractors that work habitually with the unit is the best solution. Although, there is also many soldier solutions to replacing the maintenance support that a unit will lose if the contractors do not deploy, no leader wants to depend on the unknown when deploying. Soldiers have the capability to fully support the mission of their unit, when a deployment removes most of the distractions to maintenance. Yet, losing the contract maintenance personnel during a deployment could cause a well-orchestrated unit some initial disorganization, when the unit can least afford it. If units are to truly "fight as we train" then the contractors should deploy with the unit.

Interpretation

The analysis and data presented in this study assuredly causes one to ponder many questions about the aviation maintenance system that the Army created to support its premier weapon system. Before addressing any conclusions from this study, the original questions must be addressed. Given the analysis and data presented the following answers are offered for the original questions.

Subordinate Questions

Question: Will Army Aviation require contract personnel to maintain an effective fighting force in the next conflict?

This answer is clearly yes. With the decreasing number of soldiers available to perform aircraft maintenance, due to manpower reductions and nonproductive maintenance time due to other requirements (training, guard, special duty, etc.) the only answer is contract maintenance. The Army could choose to increase the number of soldiers available but that would be costly. The Army could also choose to decrease the number of other responsibilities for aviation maintenance soldiers, but this would result in a soldier who was not fully combat ready or just another contractor wearing a soldiers uniform. Under the current force structure restrictions, units throughout the Army now depend on contractors to maintain acceptable readiness rates for Apaches. Losing this support when deploying for a conflict would be a definite detriment to readiness when the Army can least afford it. Retired General John W. Vessey, Jr. made the following remarks during a recent speech at the United States Military Academy, "The Secretary and the Chief understand the problem and are working for change. Their changes and the changes you will be able to make can move us to an Army where those who wear the uniform will be almost exclusively fighters or the providers of very direct combat and combat service support to the

fighters."[46] It is clear in this time of constrained resources that the Army's leaders are inclined to increasingly turn to contractors for all tasks short of fighting. Therefore, contractors will be essential for Army Aviation to maintain an effective fighting force in the next conflict.

At what level will contract maintenance personnel be available in a conflict? Contractors will be available at the same units, in the same quantities, during a conflict, as they currently are in peacetime. Because units realize how essential the contractors are to maintaining the desired level of readiness for their aircraft, they plan on deploying the same support they utilize in peacetime to the next conflict. Contractors were available in theater in Operation Desert Storm at the same rates as they were available in garrison. The lessons garnered from the use of contractors to support aviation maintenance in Desert Storm have precipitated further refinement to the deployment of contractors to hostile areas. This analysis and refinement, coupled with the current dependence on contract maintenance in garrison, assures the improved availability of contractors in the next conflict.

What effect does the reliance on contract personnel have on the training of soldiers? The reliance on contract aviation maintenance is a double-edged sword when it comes to soldiers training. On the positive side, having the increased aviation maintenance support allows soldiers to concentrate on other Army training requirements, while the contractor continues to work on aircraft. However, the increased capabilities of the contractor cause the soldiers to see less of the complicated maintenance and spend less time gaining essential maintenance skills. While the soldier can better concentrate on soldier skills, the soldier's ability to improve his knowledge and skills in aviation maintenance is significantly diminished. Therefore the ability of that soldier to maintain the Apache aircraft without contractor assistance is in question.

Is it cost effective to pay contractors to perform aviation maintenance? Although at first look comparing take home pay of a soldier versus the pay of a contractor, it would seem that

contract maintenance is not cost effective. However, when the training costs, productive maintenance time, and on-the-job training costs of a soldier are considered, the contractor is actually a bargain. The benefits of increased readiness at a reduced rate are a primary reason that contracting for aviation maintenance is growing in popularity throughout the Army. It is clear that top government officials believe that contracting is more cost effective. In his September, 1996 speech at West Point, retired General Vessey stated, "We can buy the base support and depot maintenance from the civilian economy, have the soldiers do only soldiering, save the taxpayer money, and defend the nation better."[47]

Primary Thesis Question

Does the ever growing reliance of U.S. Army Aviation on contract performance of aircraft maintenance improve AH-64 unit mission readiness? Yes. This is a simple answer to a complex question, but in the end, it is clear that contractors definitely increase the unit's mission readiness. Although many Army Aviation maintenance purists tend to believe that dependence on contract maintenance hides the military's force structure shortfalls and dilutes the already tenuous maintenance training of all technical soldiers at a high cost, the truth is that contractors improve the unit's mission readiness. Contractors are not hiding force structure shortages, but filling those shortages, at a lower cost than a soldier. Yes, soldier experience may suffer, but the opportunity to work closely with highly experienced contractors has offsetting benefits. The readiness of contractors to deploy quickly, with their supported unit provides the unit with the same capability in garrison as it has in conflict. Although a deployed contractor can be expensive, the increased use of contractors gives the Army the ability to defer the cost of maintaining expensive soldiers, in the event of conflict, for the cheaper and more productive contractor. The base of trained maintenance soldiers and training facilities could be easily expanded, in conflict, to keep the

deployed contractors to a minimum. This use of contractors creates an effective peacetime force to provide ready aircraft for mission requirements, while maintaining the same capability to deploy to conflicts. The increased costs of a deployed contractor could then be offset by increasing the number of soldiers available to deploy to the conflict. The situation provides the Army with the most effective use of its force structure billets and its available funds. This effective use of funds can further increase the unit's mission readiness by freeing funds for the Army to use in other areas.

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[2]Stephen Snow, "Responsive Helicopter Maintenance - An Imperative for Air Land Battle Future" (Executive Research Project, Industrial College of the Armed Forces, 1991), 63.

[3]FM 25-101, 3-28.

[4]U.S. Army, 101st Airborne Division (Air Assault), "Aviation Maintenance Contract with DynCorp," (Fort Campbell, KY: Division Aviation Maintenance Office, 1996), A.1.1.1.

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[6]Jim D. Keirsey, "Army Aviation Maintenance—What is Needed?," (Individual Study Project, U.S. Army War College, 1992), 14.

[7]General Accounting Office, Apache Helicopter: Serious Logistical Support Problems Must Be Solved to Realize Combat Potential (Washington, D.C.: U.S. Government Printing Office, 1990), 15.

[8]Fort Campbell DynCorp Maintenance Contract, clause C.1.2.6.

[9]Keirsey, 14.

[10]Ibid, 15.

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[12]James Lambert, ATCOM AH-64 Program Manager's Office, Telephonic interview by author, 25 October 1996.

[13]Keirsey, 26.

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[15]Fort Campbell DynCorp Maintenance Contract, 1996.

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[18]Reginald Joules et al, "Military Occupational Specialty Training Cost Handbook" (Indianapolis: Army Finance and Accounting Center, 1983), A-III-A-99.

[19]Tom Hall, USAALS, Helicopter Training Division, Deputy Director for Training Administration, Telephonic interview by author, 9 January 1997.

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[22]Ibid.

[23]Fort Campbell DynCorp Maintenance Contract, 1996.

[24]Stephen Kee, AH64 Program Manager, Memorandum to AH-64 to Field Units, 18 Sep 1996, ATCOM, St. Louis, MO.

[25]Victor Conner, McDonnell Douglas Field Service Department, Telephonic interview by author, 19 Mar 97.

[26]Ibid.

[27]General Accounting Office, Apache Helicopter: Serious Logistical Support Problems Must Be Solved to Realize Combat Potential (Washington, D.C.: U.S. Government Printing Office, 1990), 21.

[28]Ibid., 24.

[29]Ibid., 62.

[30]Ibid., 43.

[31]Ibid., 44.

[32]U.S. Army, Field Manual (FM) 101-10-1/2, Staff Officers' Field Manual Organizational, Technical and Logistical Data Planning Factors(Washington DC, Department of the Army, October 1987), 2:2-18.

[33]General Accounting Office, 64.

[34]Ibid., 63.

[35]CW5 David Clark, 101st Division Aviation Contracting Officer, Telephonic Interview by author, 1 April 1997.

[36]Ibid., 67.

[37]Ibid., 68.

[38]Ibid., 50.

[39]CW5 John Yetter, 101st Aviation Brigade Maintenance Officer, Telephonic Interview by author, 9 January 1997.

[40]Office of the Secretary of Defense, Report of the Reserve Forces Policy Board, FY 1995 (Washington: Office of the Secretary of Defense, 1996), 2.

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[43]Department of Defense, Conduct of the Persian Gulf War (Washington: Department of Defense, 1992), 600.

[44]"US Army Aviation Center Operation Desert Storm After Action Review", U.S. Army Gulf War Collection, Scales Group Papers, subgroup Historian's Background Material, sub-subgroup A-011 (Fort Leavenworth, KS: Combined Arms Research Library).

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[46]John W. Vessey, Jr. Remarks from the 1996 Sylvanus Thayer Award acceptance speech, United States Military Academy, September 25, 1996.

[47]Ibid.

CHAPTER 5

FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This research points to several significant conclusions, which are important for aviation leaders throughout the Army to understand. Each of the individual criteria examined yields some enlightening findings. Collectively, these conclusions present a road map to the future for Army aviation leaders. Before a discussion of the conclusions and recommendations, the key findings of each individual criteria examined in this study will be summarized.

Findings

The first major finding is that although the Army has an effective training doctrine that provides the focus and organization for all units to develop a training plan, the doctrine does not fit the needs of all units. Support units throughout the Army are victims of a cumbersome training system that, even when religiously planned, is rarely executed due to the requirement to provide support to customer units. Support units need the same training as combat units to survive on the battlefield, maybe just less of it.

The training demands and mission support requirements for a support unit leader are immense. It is up to the leader to find a comfortable mix of providing the soldiers the training they need, while allowing time to provide the mission support that his customers demand. Making effective use of the training time available to maximize the performance of soldiers, when providing mission support, is an art. Soldiers do not mind falling behind on their maintenance support mission if the training they are receiving is valuable and exciting. Less frustration during

training periods is more conducive to productive mission support maintenance. Effectively performing both tasks is less frustrating for the soldiers and their leaders.

Due to the numerous other demands on the soldier's time, the contractor presents a viable alternative to providing full-time mission support even while the soldiers are doing other tasks. Contractors offer an experienced, dependable work source that is able to provide the same support on a daily basis, without numerous distractions.

The second major finding is that soldiers are expensive maintainers. Although when comparing the base salary of a contractor with that of a young soldier, it seems that the soldier is cheaper labor, the total cost of a aviation maintenance soldier is staggering. Maintaining a large number of these expensive soldiers, especially considering their relatively small amount of maintenance production, is not in the best interests of the Army. The more experienced, more focused contractor produces the best aircraft readiness benefits, at the most efficient price.

The third finding, that Army aviation required maintenance contractors to overcome readiness shortfalls in the Apache, is not necessarily revolutionary. As with any major weapon system, the Apache experienced some initial growing pains. The increased use of maintenance contracting was the fastest, most cost-effective method to overcome the Apache's initial problems. The improved readiness of the Apache after the initial readiness problems shows that to increase readiness requires increased maintenance man-hours.

The final finding of the criteria analysis is that deployability of maintenance contractors is essential to ensure success in the next conflict. Apache units throughout the Army have come to depend on the increased readiness that the maintenance contractor allows them to enjoy during peacetime. In the time of conflict, Apache units will need this same support immediately available to be able to adequately support their tasked missions. Any unit that utilizes contract support in peacetime has to plan on how that capability will be handled when deployed to a conflict. If the

same level of support that a unit utilizes in garrison is not available in war, then the unit, and the Army, is not as combat ready as it believes.

Conclusions

The use of contract maintenance to support Apache readiness is a successful, cost-effective program that makes efficient use of available funds to support mission requirements and to nullify unit structure shortfalls. The use of contracts to support the Army with dedicated, experienced maintenance personnel to supplement the overtaxed maintenance soldier is a system that has evolved, by necessity, to become a successful program poised as a potential model for other programs throughout the Army. For Army Aviation this program has increased weapons system readiness, at a relatively low cost, while relieving the workload on a downsizing force structure. With the proper administration, the Army could reap benefits by implementing the Aviation model throughout the Army.

The current use of civilian contractors for aviation maintenance, at the unit level, shows the immense evolution of privatization from its beginnings during the Eisenhower administration. Although today's use of contractors was probably never the intention of the Bureau of Management and Budget in 1954, the original A-76 process set the precedent for this eventual level of privatization evolution. As with the evolution of anything, the final form is not known or planned for, until it actually exists. The current aviation maintenance support structure appears to be nearing the end of its evolution from all-soldier maintenance to the system in place today. Unfortunately, the final form was a mystery, until recently, and therefore, the Army is behind in properly supporting this maintenance support structure.

The Army must recognize that it has arrived at a position where it cannot, or chooses not to, properly support the force structure required to maintain mandated readiness rates for the

Apache. Local commanders have put a system in place to fix the force structure shortages. The Army must formalize this system in its doctrine and support it at the Army level rather than at the installation level. The expertise to negotiate, and administer contracts at the Army level is lost, as is the economy of scale, because the Army does not formally recognize this method of overcoming decreased readiness levels in aviation units. Installation level commanders have proven the utility of the use of contract aviation maintenance, now the Army must recognize and support this system.

If the Army does not formalize this program soon, it will continue to evolve into a system that is not as flexible as the current system. The never-ending cycle of justifying the reduction in maintenance soldiers, based on the acceptable readiness rates they produce, while ignoring the contributions of the contract maintainers, will eventually produce an Army maintenance unit with very few maintenance soldiers. The reduced requirements for Apache maintenance soldiers would cause a similar reduction in the capabilities of the school. Then the ability to rapidly increase the number of trained maintenance soldiers, in the event of conflict, to replace the costly deployed contract workers, would be lost. The benefits of the current maintenance system, as it has evolved, is its increased readiness, at reduced cost, during peacetime, with the ability to expand soldier maintenance capability in the event of war. The Army must act now to formalize the existing use of contract maintenance in order to maintain the flexibility of the current system.

Recommendations

The initial readiness problems of the Apache appeared to be the result of the undersized maintenance structure developed to support the aircraft. The under manning was the result of faulty data developed during the initial testing of the aircraft. Although it is difficult to prove conclusively, it appears that the data collected during Apache testing was intentionally skewed to hide the true cost of maintaining such a complex system as the Apache. Although showing the true

costs of maintaining such a complex weapon system makes it much more difficult to justify, developing an adequate maintenance structure, after the fact, is actually more expensive and difficult. The initial readiness difficulties of the Apache, and the resulting evolution of its maintenance system, was the result of a flawed acquisition process. The proper acquisition, testing and funding of future Army weapons systems is in need of additional study.

Although it seems obvious, considering the current widespread use of contract maintenance and the reduced force structure, that contract maintenance is essential to maintaining the readiness rates required for Apaches to meet their mission requirements, the Army does not recognize the need to standardize the Apache contract maintenance across the Army. ATCOM would seem to be the agency best suited to standardize and administer such a widespread maintenance program. However, rather than stepping forward and recognizing the need for a standardized program, ATCOM seems content to allow installations across the Army to fund and administer their individual programs. This is another area for additional study. Could the Army benefit from ATCOM administering an Army wide Apache maintenance program rather than allowing each installation to administer its own? Why is ATCOM avoiding involvement in the installation's Apache maintenance programs? Resolving these questions could result in additional savings to the Army, and develop a program that would serve as a model that the rest of the Army could utilize to reorganize their systems.

A final area for additional study is the effects of contract maintenance on the morale of soldiers and of the contract employees. Contracting maintenance allows companies to make large profits by capitalizing on the Army's inefficiencies resulting from maintaining a fighting force, while maintaining aircraft. Is the lure of higher pay, but greatly decreased benefits, causing soldiers to leave the Army to work for contractors? Is it an advantage or a disadvantage to have soldiers working side by side with contractors? Is the contractor exploiting its workers by hiring

them with little promise of long term employment, due to frequent contract changes, and few benefits? Will contractors perform with the same sense of duty as soldiers? To what extent is the Army training the contractor's work force? The answers to these questions are well beyond the limits of this study, but are relevant to the performance of both contract workers and soldiers and their ability to continue to contribute to the readiness of Army aviation units worldwide.

The soon to be released Quadrennial Defense Review (QDR) report promises to make contracting out logistics even more prevalent and widespread than it currently is in the Army. The recent Army Warfighting Experiment (AWE) at the National Training Center (NTC), with the first Force XXI brigade, foreshadowed the level of contractor involvement in the future Army. The Force XXI brigade required support from over 1400 contractors, ten percent of which lived in the field with the solders.[1] The contracting effects on the training, cost, readiness, and deployability of Army units promises to be an increasingly important issue for the Army in the future. Now is the time for the Army to investigate its use of contractors and how to use them even more efficiently and effectively to maximize the benefits for the entire Army.

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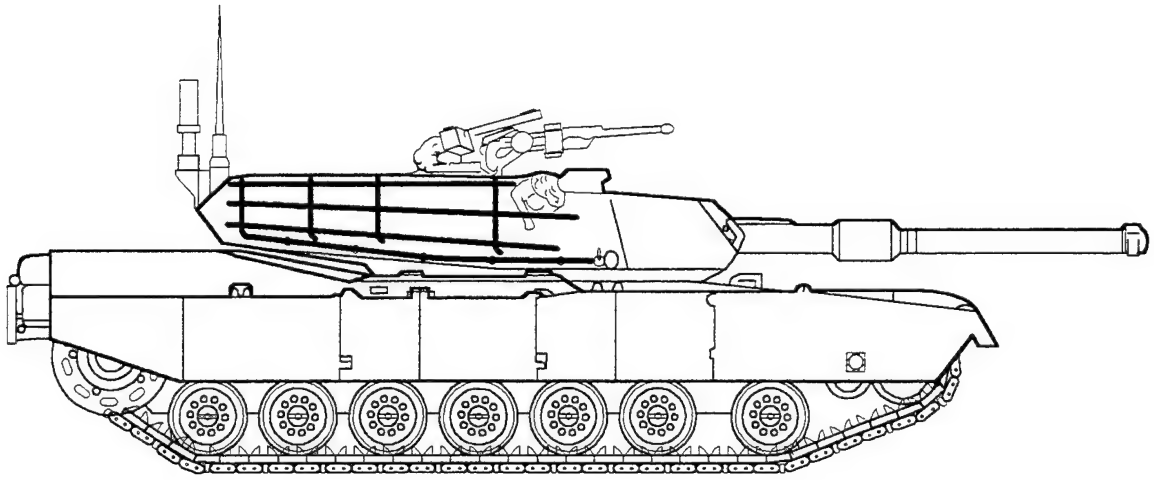
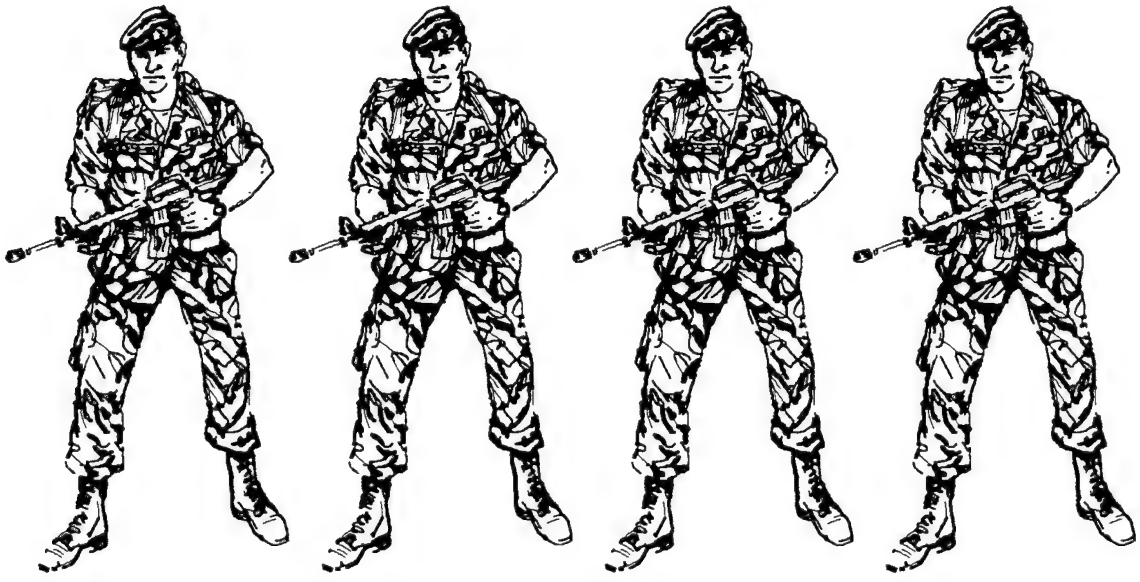
[1]George I. Seffers, "Experiment: Two Revolutions in One," Army Times, 7 April 1997, 26.

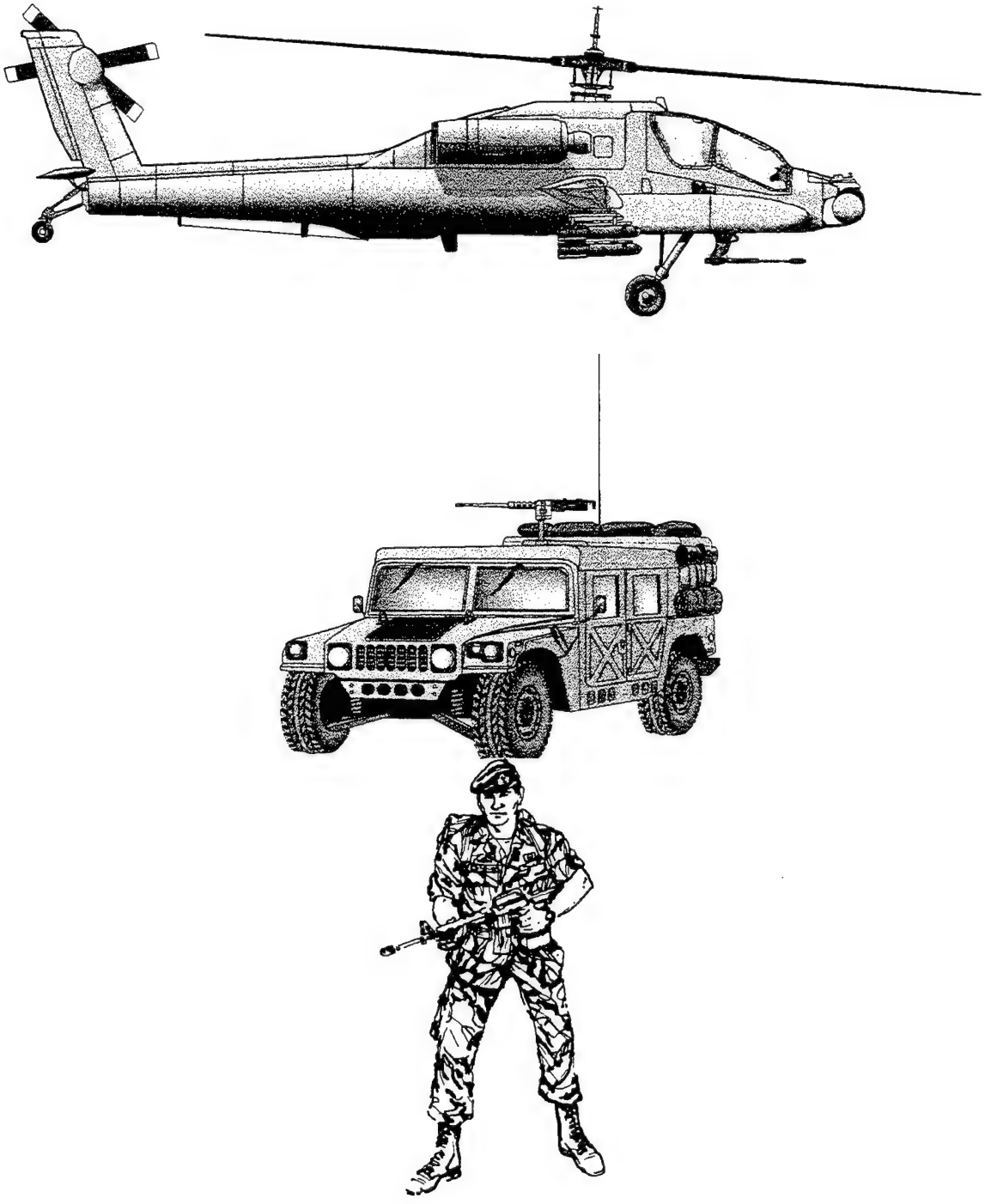
APPENDIX A

ARMOR MAINTAINER TO EQUIPMENT RATIO





AVIATION MAINTAINER TO EQUIPMENT RATIO



APPENDIX B

FY 97 Army Composite Standard Rates

GRADE	ANNUAL (1)	ANNUAL (2)	DAILY (3)	HOURLY (4)
O-10	167,150	177,179	777.82	97.45
O-9	162,294	172,032	755.22	94.62
O-8	148,068	156,952	689.02	86.32
O-7	132,726	140,690	617.63	77.38
O-6	126,832	134,442	590.00	73.94
O-5	103,150	109,339	480.00	60.14
O-4	88,229	93,523	410.57	51.44
O-3	74,862	79,354	348.36	43.64
O-2	55,860	59,212	259.94	32.57
O-1	42,253	44,788	196.62	24.63
WO-5	87,365	92,607	406.54	50.93
WO-4	82,687	87,648	384.77	48.21
WO-3	69,299	73,457	322.48	40.40
WO-2	57,131	60,559	265.85	33.31
WO-1	46,690	49,491	217.27	27.22
E-9	68,719	81,088	355.98	44.60
E-8	58,099	68,557	300.97	37.71
E-7	50,086	59,101	259.45	32.51
E-6	42,735	50,427	221.37	27.73
E-5	36,421	42,977	188.67	23.64
E-4	30,349	35,812	157.21	19.70
E-3	25,177	29,709	130.42	16.34
E-2	23,777	28,057	123.17	15.43
E-1	23,750	28,025	123.03	15.41
CADETS	9,363	11,048	48.50	6.08

Note: The rates in column (1) are the baseline for each grade without acceleration factors included. This column includes PCS costs of 2,949 for officers and warrant officers and 1.962 for enlisted personnel and 112 for cadets. The rates in column (2) include acceleration factors of 6 percent for officers and 18 percent for enlisted personnel. These factors recover costs for quarters, subsistence, medical and other personnel support. Columns (3) and (4) include 14 percent of column (2) for both officer and enlisted personnel to recover accrued leave and holiday costs. This 4 percent applies only to personnel assigned (or detailed) for less than one year (or a portion thereof if for more than one year).

APPENDIX C

AH64 READINESS BY DIVISION

UNIT	# ACFT O/H	# REPORTED	FMC	# FLT HOURS	FLT HRS/ACFT
		1996			
1st Armored Div	26	8	80	883	
1st CAV Div	23	13	79	1451	
3rd INF Div	24	21	78	3179	
3rd ACR	16	14	66	1431	
4th INF Div	23	11	73	1276	
17th AVN Bde	18	15	92	3127	
18th AVN Bde	48	43	74	6867	
101st AVN Bde	71	64	81	10880	
TOTAL	249	189	77.9	29094	153.9
		1995			
1st Armored Div	22	19	78	3239	
1st CAV Div	17	1	74	228	
3rd INF Div	20	17	69	2140	
3rd ACR	16	14	66	1421	
4th INF Div	20	18	69	2112	
17th AVN Bde	18	17	89	3359	
18th AVN Bde	41	32	71	4883	
101st AVN Bde	62	55	74	9071	
TOTAL	216	173	73.8	26453	152.9
		1994			
1st Armored Div	19	18	86	2992	
1st CAV Div	18	9	69	1161	
3rd INF Div	18	14	81	2174	
4th INF Div	16	16	48	2006	
17th AVN Bde	13	13	81	2448	
18th AVN Bde	36	33	73	5157	
101st AVN Bde	54	52	69	8095	
TOTAL	174	155	72.4	24033	155.1

AH64 READINESS BY DIVISION

UNIT	# ACFT O/H	# REPORTED	FMC	# FLT HOURS	FLT HRS/ACFT
		1993			
1st Armored Div	22	18	64	1399	
1st CAV Div	18	11	73	1976	
3rd INF Div	17	11	68	1483	
4th INF Div	17	14	61	1536	
17th AVN Bde	8	8	35	136	
18th AVN Bde	35	32	66	5704	
101st AVN Bde	54	53	67	8215	
TOTAL	171	147	62	20449	139.1
		1992			
1st Armored Div	18	18	73	2890	
1st CAV Div	19	10	67	1666	
3rd INF Div	19	15	75	1995	
4th INF Div	18	4	65	586	
18th AVN Bde	29	24	67	2521	
101st AVN Bde	51	49	75	8479	
TOTAL	154	120	70.3	18137	151.1
		1991			
1st Armored Div	18	13	57	1406	
1st CAV Div	18	16	63	1424	
3rd INF Div	18	13	57	1984	
4th INF Div	17	14	69	2370	
18th AVN Bde	19	12	73	524	
101st AVN Bde	20	19	82	2397	
TOTAL	110	87	66.8	10105	116.1
		1990			
1st Armored Div	18	15	74	3063	
1st CAV Div	18	16	56	1853	
3rd INF Div	18	13	57	1984	
101st AVN Bde	19	17	82	4184	
TOTAL	73	61	67.3	11084	181.7

AH64 READINESS BY DIVISION

UNIT	# ACFT O/H	# REPORTED	FMC	# FLT HOURS	FLT HRS/ACFT
		1989			
1st Armored Div	10	10	47	186	
1st CAV Div	18	18	34	2052	
3rd INF Div	16	16	42	2177	
101st AVN Bde	20	19	73	3474	
TOTAL	64	63	49	7889	125.2
		1988			
1st CAV Div	19	19	64	2859	
3rd INF Div	15	15	40	2050	
101st AVN Bde	18	18	79	2850	
TOTAL	52	52	61	7759	149.2

AH64 READINESS BY MACOM

UNIT	# ACFT O/H	# REPORTED	FMC	# FLT HOURS	FLT HRS/ACFT
		1996			
FORSCOM	265	208	77	26486	
USAREUR	119	84	79	13853	
ARNG	147	128	47	14988	
USAR	44	42	53	6773	
EUSA	40	35	88	6093	
TOTAL	615	497	68.8	68193	137.2
		1995			
FORSCOM	266	209	67	25923	
USAREUR	130	120	76	16378	
ARNG	140	133	50	16921	
USAR	42	40	62	7232	
EUSA	38	37	84	6765	
TOTAL	616	539	67.8	73219	135.8
		1994			
FORSCOM	273	237	67	31000	
USAREUR	155	144	78	20180	
ARNG	130	129	55	16367	
USAR	32	27	43	4495	
EUSA	17	16	80	2667	
TOTAL	607	553	64.6	74709	135.1
		1993			
FORSCOM	286	237	64	34969	
USAREUR	183	147	68	17573	
ARNG	129	128	54	18592	
USAR	16	15	40	1966	
EUSA	8	8	35	186	
TOTAL	622	535	52.2	73286	137.0
		1992			
FORSCOM	274	230	67	35500	
USAREUR	193	184	70	24456	
ARNG	103	103	56	13690	
TOTAL	570	517	64.3	73646	142.4

AH64 READINESS BY DIVISION

UNIT	# ACFT O/H	# REPORTED	FMC	# FLT HOURS	FLT HRS/ACFT
		1991			
FORSCOM	251	183	65	23569	
USAREUR	184	142	62	16113	
ARNG	77	75	53	8715	
TOTAL	512	400	60	48397	121.0
		1990			
FORSCOM	217	181	58	30802	
USAREUR	151	138	74	23677	
ARNG	74	71	57	10948	
TOTAL	442	390	63	65427	167.8
		1989			
FORSCOM	210	189	39	26402	
USAREUR	104	103	62	15823	
ARNG	54	54	43	6989	
TOTAL	368	346	48	49214	142.2
		1988			
FORSCOM	127	124	55	21099	
USAREUR	59	57	63	8674	
ARNG	27	27	53	4116	
TOTAL	213	208	57	33889	162.9
		1987			
FORSCOM	76	73	40	10146	
USAREUR	23	22	30	2933	
ARNG	16	16	46	622	
TOTAL	115	111	38.7	13701	123.4
		1986			
FORSCOM	27	26	51	2880	
USAREUR	18	18	10	204	
TOTAL	45	44	31	3084	70.1

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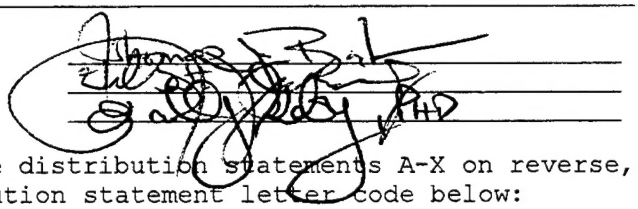

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